

THE SPIDER FAMILY CYATHOLIPIDAE IN MADAGASCAR (ARANEAE, ARANEOIDEA)

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ABSTRACT. The family Cyatholipidae is newly recorded from Madagascar, including the following new taxa: *Ulwembua ranomafana* new species, and *Ulwembua antsiranana* new species; *Vazaha toamasina* new genus new species; and *Alaranea* new genus, including *Alaranea betsileo*, *Alaranea alba*, *Alaranea merina*, and *Alaranea ardua*, all new species.

Madagascar is widely recognized as being of great conservation importance (National Research Council 1980; Rasoanaivo 1990) because the island is known for high rates of endemism and unique occurrence of primitive members of otherwise widespread taxa (Myers 1988). Ongoing rapid habitat destruction, particularly of forests, makes the collection, description, and study of the evolutionary and biogeographic significance of the Malagasy biota particularly urgent. Nevertheless, the spider fauna of Madagascar remains poorly known. The number of spider species recorded from the whole island only slightly exceeds 400 (V. Roth *in lit.*), significantly less than the 626 species recorded from the British Isles (Merrett, Locket & Millidge 1985; Merrett & Millidge 1992). Yet, nearly 400 species have been collected from a single site in the southern part of the island (V. Roth pers. comm.), suggesting a rich fauna. Alderweireldt & Jocqué (1994) suggest that the known component of the Malagasy spiders fauna is around 10%, a figure rendered more credible by the recent discovery of a hitherto unknown spider family (Jocqué 1994). Given the current state of our knowledge, the discovery of Cyatholipidae in Madagascar is not surprising.

The Cyatholipidae were previously known from Africa, Jamaica, New Zealand and Australia (Griswold 1987; Forster 1988; Simon 1894). Three species from Baltic amber are attributed to this family (Wunderlich 1993). Seven new species belonging to three genera, two of them new, are herein described from Madagascar. Two new species, *Ulwembua ranomafana* and *U. antsiranana*, have their

congeners in southern Africa. A new genus, *Alaranea*, appears to be closely related to an undescribed genus from the mountains of eastern Africa. The affinities of the new genus *Vazaha* are enigmatic.

All of the new species occur in moist forests, where some may be very common. The new species *Alaranea betsileo*, *A. merina*, and *Ulwembua antsiranana* are among the most common arboreal spiders in the forests where they occur. Dozens may be found in an hour of collecting. All hang beneath sheet webs (see Davies 1978). That these common spiders were previously undescribed underscores the poor state of our current knowledge of the Madagascar spider fauna.

The material upon which this study was based was largely collected by the author and colleagues Nikolaj Scharff, Jonathan Coddington, Scott Larcher and Rija Andriamasanana during October–December 1993. Most material collected during that period is divided among the California Academy of Sciences (CAS), Zoological Museum, University of Copenhagen (ZMUC), and Smithsonian Institution, Washington D.C. (USNM). Additional material was made available through the courtesy of J. Coddington of the USNM, R. Jocqué of the Musée Royal de L'Afrique Centrale, Tervuren (MRAC), H. Levi of the Museum of Comparative Zoology, Harvard (MCZ), C. Rollard of the Muséum National d'Histoire Naturelle, Paris (MNHN), and Vincent and Barbara Roth.

METHODS

Prior to examination with a Hitachi S-520 scanning electron microscope all structures were

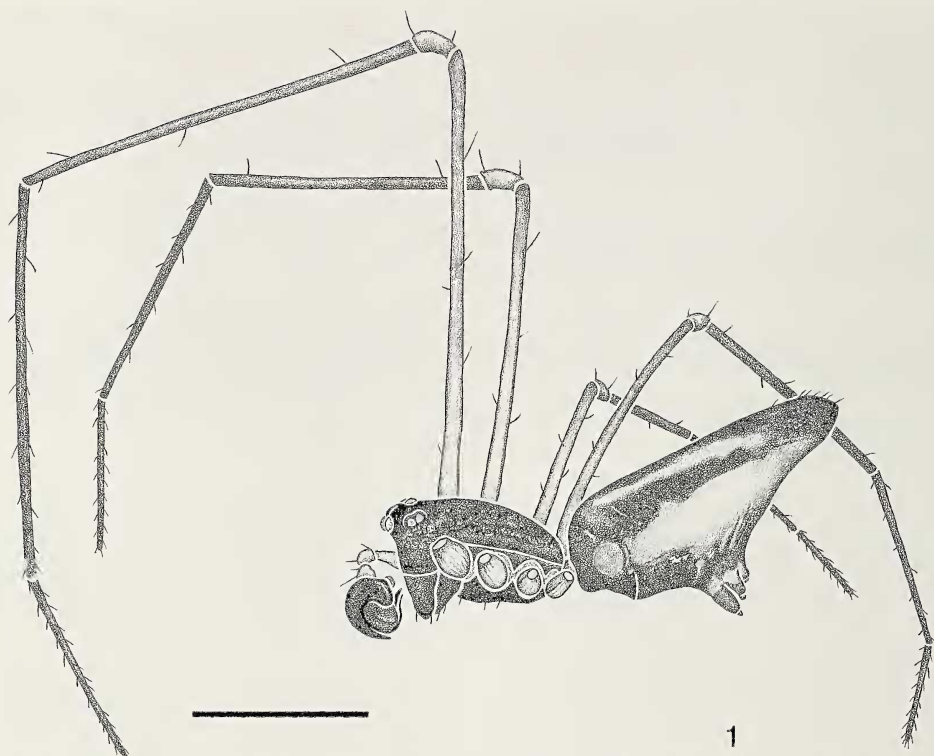


Figure 1.—*Utwembua antsiranana* new species, holotype male, lateral view. (Scale bar = 1 mm)

critical point dried. Vulvae were cleaned by exposure to trypsin, bleached in "Chlorox" household bleach (5.25% sodium hypochlorite), stained with Chlorazol Black, and mounted in Hoyer's Medium for examination and photography. Examination was via Wild M5Apo and Leitz Ortholux II microscopes, and photography of vulvae was by an Olympus PM-10AK attached to the Leitz Ortholux II. Small structures were examined in temporary mounts as described in Coddington (1983).

Abbreviations are listed in Table 1. All measurements are in mm. Specimens measured were chosen to encompass largest and smallest individuals.

TAXONOMY

Cyatholipidae Simon 1894

Cyatholipeae Simon 1894:711, based on *Cyatholipus hirsutissimus* Simon 1894. Roewer 1942:967.

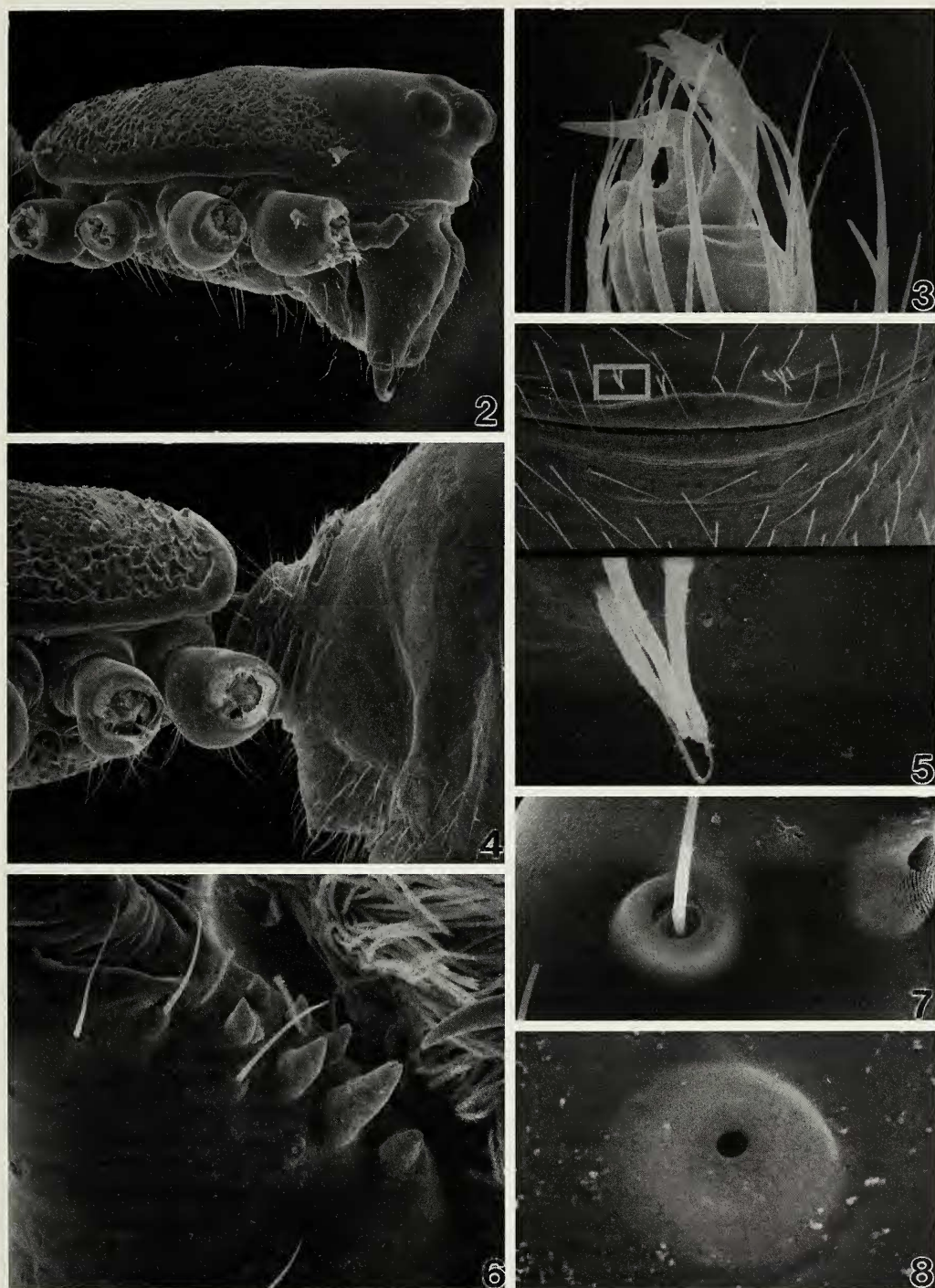
Cyatholipinae, Wunderlich 1978:33.

Teemenaaridae Davies 1978:42, based on *Teemenaarus silvestris* Davies 1978.

Cyatholipidae, Platnick 1979:116. Brignoli 1983:231. Griswold 1987:501. Forster 1988:7. Platnick 1989:181. Platnick 1993:172. Wunderlich 1993:234.

Diagnosis.—Colulate, entelegyne araneoids that share with the Synotaxidae a cup-shaped paracymbium (Fig. 33) and posteriorly broadly truncate sternum (Figs. 49, 67), and differing in having a retromedian cymbial process (Figs. 17, 33) and very broad posterior respiratory groove (Fig. 52).

Description.—For full description see Griswold (1987) and Forster (1988). Total length 1–4 mm; labium broader than long (Fig. 49); chelicerae smooth laterally with three small retromarginal and, in most taxa, four large promarginal teeth (Fig. 6); legs spineless (Figs. 1, 15, 68), ITC short (Fig. 3); tarsal organ (Fig. 8) and trichobothrial bases (Fig. 7) round and smooth; spinning organs (Figs. 9–14) typical of the Araneoidea in having a single ALS major ampullate gland spigot plus nubbin and 12–14 piriform gland spigots with highly reduced bases; PMS with large, anteromedian cylindrical gland spigot, two aciniform gland spigots, and posterior minor ampullate gland spigot, CY spigot absent in male; PLS with araneoid triplet of one flagelliform gland and two aggregate gland spigots, two AC spigots, and a single mesal CY spigot



Figures 2-8.—Morphology of *Alaranea* spp. 2, 4. Carapace and abdomen, lateral view; 3. Apex of tarsus I, showing claws; 5. Epiandrous region: epigastric furrow with epiandrous spigots (upper), close-up of epiandrous spigots (lower); 6. Cheliceral fang furrow, anterior; 7. Trichobothrial base, tibia I; 8. Tarsal organ, palpus; 2, 8. *Alaranea betsileo* new species, male from Talatakely; 3, 4, 6, 7. *Alaranea betsileo* new species, female from Talatakely; 5. *Alaranea merina* new species, male from Perinét.

KEY TO THE CYATHOLIPIDAE OF MADAGASCAR

1. Abdomen not sclerotized around base of pedicel, male lacking scutum; parembolic process absent; coxae separated by soft cuticle, pleural and sternal sclerotizations separate (Figs. 1, 15, 41) 2
- Abdomen sclerotized completely around base of pedicel to form annulate petiole produced dorsally into a short projection or horn (Figs. 4, 68, 94); abdomen of males with a thin, shiny transparent dorsal scutum (Fig. 95); parembolic process present (Figs. 60, 62, 73); pleural and sternal sclerotizations meet to surround coxae (Figs. 68, 94) (*Alaranea* new genus) 4
- 2(1). Chelicerae with basal projection small or lacking; epigynum with median hood (Figs. 18, 19); apex of cymbial RMP directed ventrad, well separated from PC (Figs. 22, 33) (*Ulwembua*) . . . 3
- Chelicerae with large basal projection (Fig. 41); epigynum lacking median hood (Figs. 29, 30, 43); apex of cymbial RMP directed distad, juxtaposed to PC (Figs. 44, 48)
- *Vazaha toamasina* new genus, new species
- 3(2). Conductor simple (Figs. 20, 34); carapace dark except along lateral margins and on central longitudinal band extending from posterior median eyes posteriorly to behind thoracic fovea (Fig. 39); afferent duct of vulva with three loops (Fig. 36) *Ulwembua ranomafana* new species
- Conductor bipartite (Figs. 16, 23); carapace light except ocular area, margins of pars cephalica, and diffuse radii from thoracic fovea on pars thoracica dark (Fig. 38); afferent duct of vulva with five loops (Fig. 35) *Ulwembua antsiranana* new species
- 4(1). Males 5
- Females 8
- 5(4). Conductor simple (Figs. 72, 79, 88) 6
- Conductor bipartite, with thin, broad proximal piece separate from conductor proper (Fig. 61)
- *Alaranea betsileo* new species
- 6(5). Proximal point of conductor no longer than distal cup (Figs. 72, 88) 7
- Proximal point of conductor elongate attenuate (Figs. 58, 79) *Alaranea alba* new species
- 7(6). Proximal point of conductor small, narrower than cup (Fig. 72) *Alaranea merina* new species
- Proximal point of conductor thick, bifid, equal in width to cup (Fig. 88)
- *Alaranea ardua* new species
- 8(4). Sternum dark red-brown to black (Fig. 97), abdomen of most specimens with extensive dark markings 9
- Sternum pale yellow-brown, abdomen white, marked with lateral, ventral, and posterior black spots (Figs. 67-69) *Alaranea alba* new species
- 9(8). Dorsum of abdomen (Figs. 65, 66, 95, 96) with longitudinal dark bands diverging from apex to middle and converging posteriorly (these bands may be bold, faint, or almost completely obscured by dark markings) *Alaranea merina* and *A. ardua* new species
- Dorsum of abdomen (Figs. 63, 64) lacking such marks, most specimens with median black band surrounding 1-2 anterior white spots *Alaranea betsileo* new species

(basal CY spigot universally absent in females); males retain triplet; colulus a triangular, fleshy lobe (Fig. 52); male epiandrous spigots scattered in groups of two to four anterior of epigastric furrow (Fig. 5); cymbium of male palpal tarsus with basal, cup-shaped paracymbium and retromedian process along the retrolateral margin of the cymbium just distad of the PC (Figs. 31, 33, 48, 70); palpal bulb (Figs. 31-34) with flattened, cup-shaped subtegulum and round to oval, convex tegulum; T with apical lobe, in most taxa produced ventromedially into blunt to pointed, dentate tegular lobe; T with median conductor, simple or consisting of two processes (e.g., in *Ulwembua antsiranana*, Fig. 23, and *Alaranea betsileo*, Fig. 61); embolus spirals clockwise

(left palp, ventral view), making nearly full turn, thick with truncus and pars pendula clearly distinguished; may or may not be a parembolic process at $\frac{3}{4}$ the length of the E (Figs. 60, 62, 73); epigynum (Figs. 25-30) of most taxa with anterior, projecting scape, posterior of this a depressed atrium with transverse, median hood hiding copulatory openings that are separated by an interior median septum; cuticle laterad of epigynum probably homologous to lateral lobes of other epigyna, these may form narrow, inward-curving processes along epigastric furrow that disappear anteriorly beneath the MH; the area between these processes comprises the epigynal median lobe; vulva (Figs. 35-37) with posteroventral copulatory openings opening into an-

Table 1.—List of anatomical abbreviations used in the text and figures.

AC	aciniform gland spigot(s)
AD	valvular afferent duct
AER	anterior eye row
AG	aggregate gland spigot(s)
AL	anterior lateral eyes
ALS	anterior lateral spinneret
A	apical lobe of tegulum
AM	anterior median eyes
AT	epigynal atrium
C	conductor
CB	cymbium
CO	copulatory opening
CY	cylindrical gland spigot(s)
E	embolus
EF	epigastric furrow
FD	fertilization duct
FL	flagelliform gland spigot(s)
HS	spermathecal head
ITC	inferior tarsal claw
LL	epigynal lateral lobes
MAP	major ampullate gland spigot(s)
mAP	minor ampullate gland spigot(s)
MH	epigynal median hood
ML	epigynal median lobe
MS	epigynal median septum
OAL	ocular area length
OQA	ocular quadrangle, anterior
OQP	ocular, quadrangle, posterior
PC	paracymbium
PER	posterior eye row
PI	piriform gland spigot(s)
PLS	posterior lateral spinneret
PL	posterior lateral eyes
PM	posterior median eyes
PMS	posterior median spinneret
PP	parembolic process
RMP	retromedian cymbial process
S	epigynal scape
ST	subtegulum
T	tegulum
TL	ventromedian tegular lobe

teriad-directed afferent duct, AD sclerotized (Figs 90–93) or hyaline (Figs. 35, 36), simple or elaborately folded, or rarely absent (Fig. 37); spermathecal head of most taxa dorsad of CO and entered laterally by AD, heavily sclerotized, nearly spherical with anterior pores; fertilization duct posterior.

Ulwembua Griswold 1987

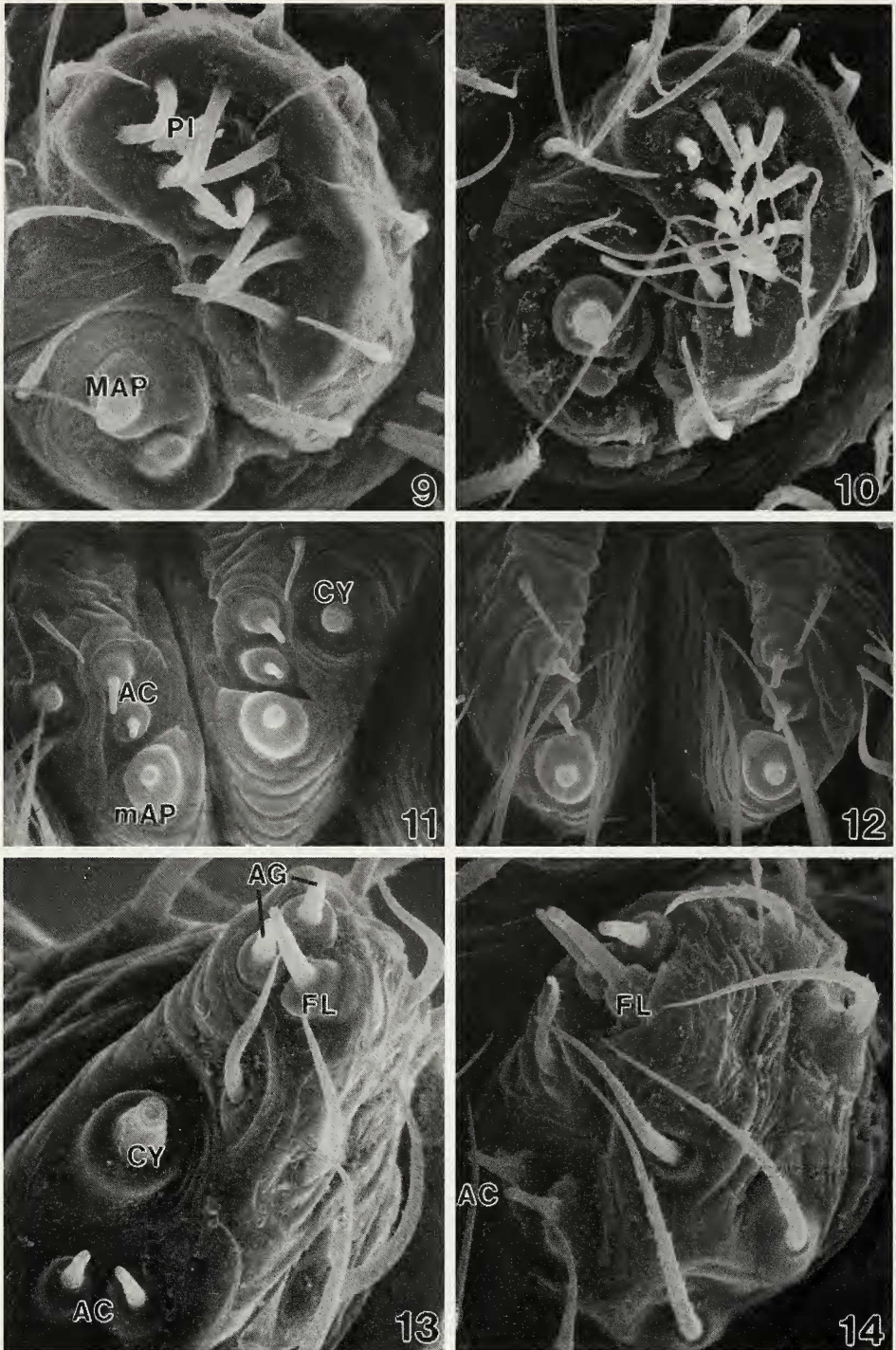
Ulwembua Griswold 1987:532. Type species, by original designation, *Ulwembua pulchra* Griswold 1987. Platnick 1989:182.

Diagnosis.—Abdomen triangular (Figs. 1, 15); coxae not surrounded by sclerotization; legs long, length femur I greater than $2.5\times$ carapace width; carapace with dorsal light mark (Fig. 39); palpus lacking PP (Figs. 16, 20); vulva with extensive, hyaline AD (Figs. 35, 36).

Description (encompasses all members of genus).—Total length 2.00–3.32. Carapace oval in dorsal view (Figs. 38, 39), length 1.39–1.61 times width, low in most species, maximum height 0.41–0.51 width; texture finely rugose to granulate, in most specimens becoming denticulate posteriorly, thoracic fovea oval to round, indistinct, shallow in female and deeper in male; carapace posterior margin truncate to weakly concave; ocular area with PER width 1.95–2.50 times OAL, 2.30–2.80 times OQP, OQP 0.83–1.07 times OQA; diameter AM 1.00–1.80 times PM, distance PM-PL 1.07–1.85 times PM diameter; clypeal height 1.22–3.21 times AM diameter, cheliceral length 1.84–3.20 times clypeal height; chelicerae unmodified or with basal projection (*Ulwembua ranomafana*). Sternum rugose to pustulate, length 0.96–1.14 times width, coxae surrounded by unsclerotized cuticle (Figs. 1, 15). Abdomen triangular, unsclerotized or sclerotized around pedicel, not petiolate; abdominal setae short, slender, bases of anterior setae slightly enlarged. Legs long, femur I 2.5–4.5 times carapace width, unmodified. Male palpus (Figs. 16, 17, 20–24, 31–34) with cymbial RMP pointing ventrad, smaller than PC; palpal bulb with dentate TL, apex a small, smooth to pustulate lobe; C smooth, variable, median or basal, longitudinal or transverse, simple or with accessory process; E thick, long, in most species embolus makes more than 1.1 rotation, base smooth, simple, origin apical near 12 o'clock; PP absent; spermduct with tight double twist (curlicue) near embolic base. Epigynum (Figs. 18, 19, 25–28) with S and MH, septum between copulatory openings slender to broad, atrial furrows may or may not extend behind S; ML parallel-sided. Vulva (Figs. 35, 36) with extensive hyaline AD, extending anterior then posterior to join HS; FD posterior.

Composition.—Five species, two in Madagascar.

Distribution.—Southern Africa; Madagascar (Fig. 98).



Figures 9-14—Spinnerets of *Alaranea betsileo* new species, from Talatakely. 9, 10. ALS; 11, 12. PMS; 13, 14. PLS; 9, 11, 13. Female; 10, 12, 14. Male. AC = aciniform gland spigots; AG = aggregate gland spigots; CY = cylindrical gland spigots; FL = flagelliform gland spigot; MAP = major ampullate gland spigot; mAP = minor ampullate gland spigot; PI = piriform gland spigots.

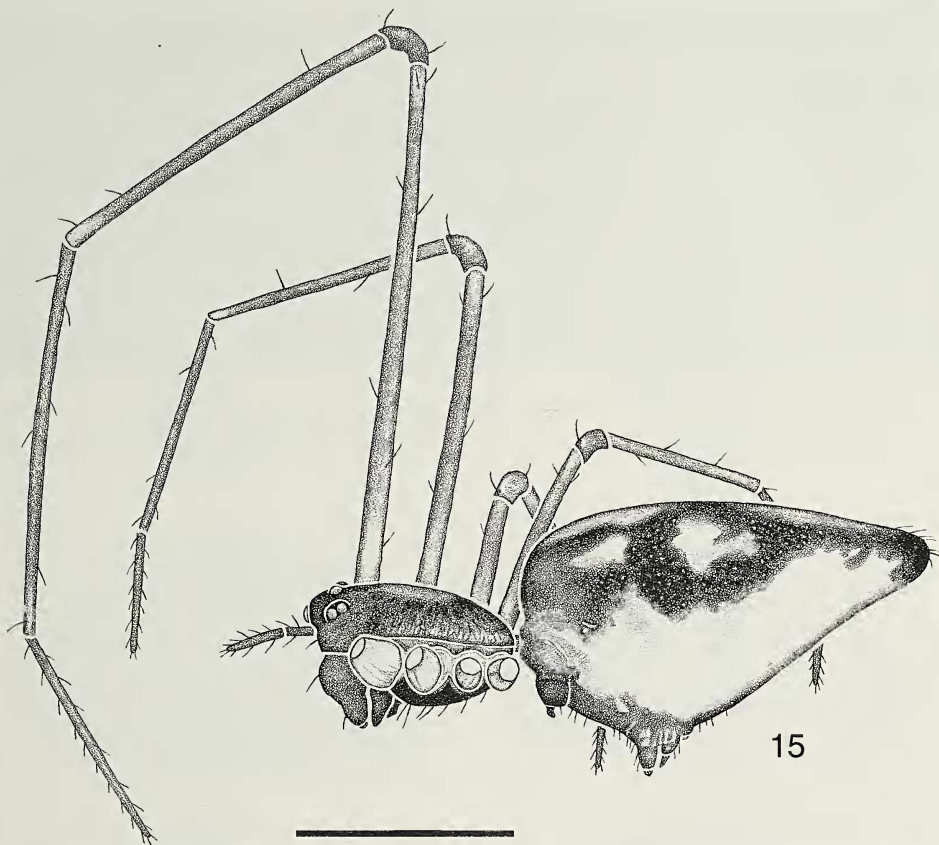


Figure 15.—*Ulwembua ranomafana* new species, paratype female, lateral view. (Scale bar = 1 mm)

Ulwembua antsiranana new species

Figs. 1, 16–18, 22–26, 35, 38, 98

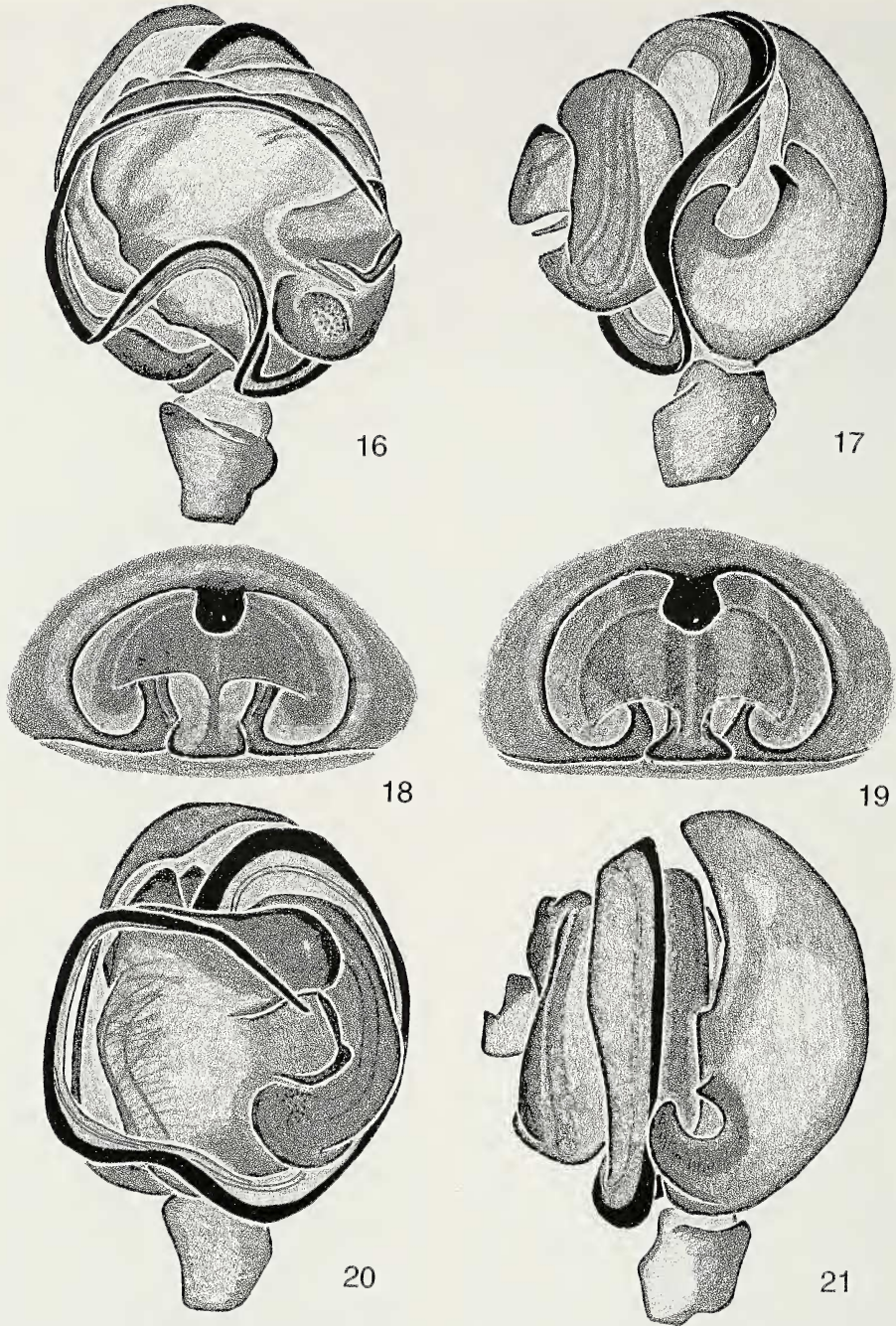
Types.—Male holotype and female paratype from forest at an elevation of approximately 1000 m at Parc National Montagne d'Ambre (12°32'S, 49°10'E), Antsiranana Province, Madagascar, 30 November 1993, C.E. Griswold (CAS).

Etymology.—Antsiranana, the province of the type locality, a noun in apposition to the generic name.

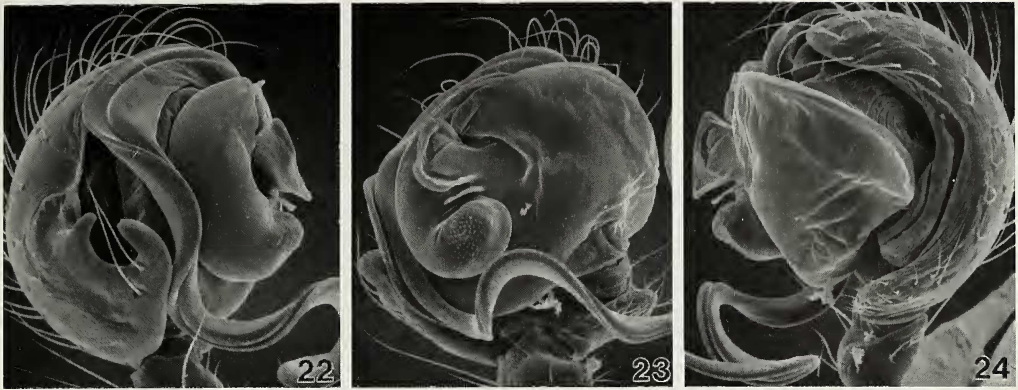
Diagnosis.—Carapace light except dark on ocular area, margins of pars cephalica, and diffuse radii from thoracic fovea on pars thoracica (Fig. 38). Male with E strongly sinuate across tegulum base, C double (Figs. 16, 23). Vulva with AD complex, having five loops (Fig. 35).

Description.—*Male (holotype)*: As in Fig. 1. Total length 2.66. Carapace dusky yellow-gray along lateral margin, gray narrowing behind ocular area, and along margins of pars

cephalica, faintly mottled in center, with dark gray forming narrow longitudinal band anterior of thoracic fovea and faint bands radiating from thoracic fovea to margin, dorsum between these marks yellow-brown; ocular area with black surrounding and extending between AM and posterior to surround each PM, and surrounding and extending between lateral eyes; clypeus yellow-brown, dark in center from AM to oral margin; chelicerae and palpal coxae brown, labium and sternum nearly black, unmarked; coxae, trochanters, legs, and palpi yellow-white, cymbium dark brown, legs shading to yellow-gray from distally on femora to tarsi, unmarked; abdomen white, dorsum with pair of median and lateral dark gray longitudinal bands that meet at abdominal apex, venter gray from abdominal apex to pedicel. Carapace 1.08 long, 0.67 wide, 0.35 high, texture finely granulate, posterior margin weakly concave; thoracic fovea round, very shallow, with small posterior pit; PER and



Figures 16-21.—Genitalia of *Ulwembua* spp. 16, 17, 20, 21. Left male palpus; 18, 19. Epigynum; 16, 18-20. Ventral view; 17, 21. Retrolateral view; 16, 17. *Ulwembua antsiranana* new species, holotype; 18. *U. antsiranana* new species, Montagne d'Ambre; 19. *U. ranomafana* new species, paratype; 20, 21. *U. ranomafana* new species, holotype.



Figures 22–24.—Right male palpus of *Ulwembua antsiranana* new species, Montagne d'Ambre. 22. Retrolateral view; 23. Ventral view; 24. Prolateral view.

AER 0.42 wide, OAL 0.20; ratio AM:AL:PM:PL, 1.33:1.08:1.0:1.17, PM diameter 0.06. Clypeus 0.18 high, chelicerae 0.35 long, unmarked. Sternum 0.58 long, 0.56 wide, rugose; labium 0.11 long, 0.19 wide; palpal coxae 0.20 long, 0.13 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.85 + 0.30 + 2.62 + 2.42 + 1.19 = [9.38]; II: 2.13 + 0.25 + 1.76 + 1.55 + 0.87 = [6.56]; III: 1.13 + 0.23 + 0.85 + 0.83 + 0.53 = [3.57]; IV: 1.70 + 0.25 + 1.32 + 1.08 + 0.62 = [4.97]; Palp: 0.29 + 0.11 + 0.10 + (absent) + 0.38 = [0.88]. Abdomen unsclerotized except between epigastric furrow and pedicle. Palp (Figs. 16, 17, 22–24) with cymbial RMP short, narrow, pointed, PC a narrow hook in lateral view; tegulum apex low, smooth, TL small, convex, with small oval denticulate patch; C large, smooth, with small, narrow basal article.

Variation: ($n = 3$) Total length 2.18–2.66; ratios of carapace length/width 1.50–1.61, height/width 0.48–0.51; ratios of PER/OQP 2.56–2.69, PER/OAL 2.05–2.10, OQP/OQA 0.83–1.00, PM-PL distance/PM diameter 1.50–1.82, diameter AM/PM 1.17–1.33; ratios of clypeal height/diameter AM 2.12–2.86, cheliceral length/clypeal height 1.84–2.05; ratio of sternum length/width 1.04–1.09; ratio of femur I length/carapace width 4.00–4.65. Dorsal longitudinal bands of abdomen narrow to broad, separate from to confluent with lateral longitudinal bands.

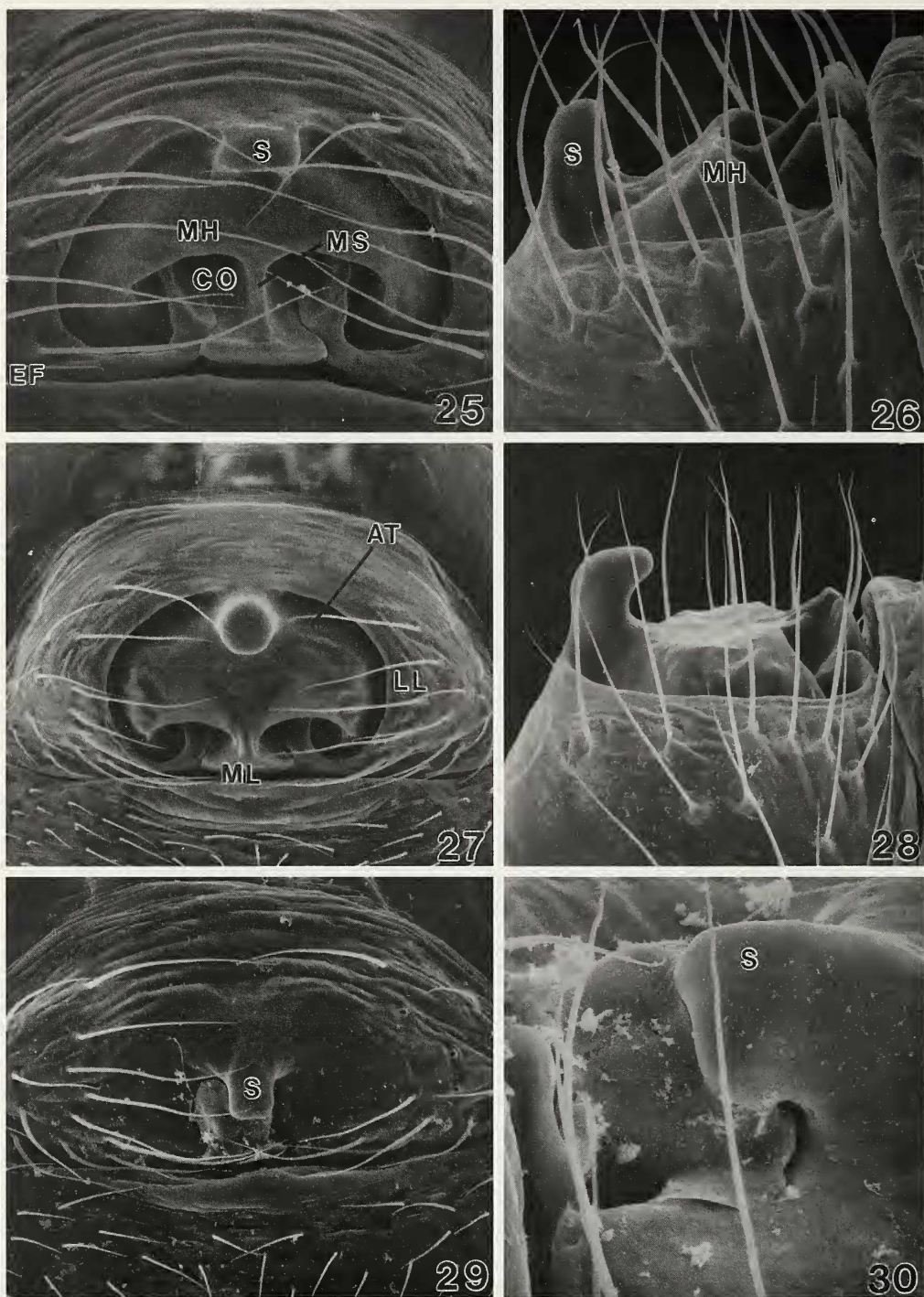
Female (paratype): Total length 2.85. Markings and structure as in male (Fig. 38). Carapace 1.05 long, 0.68 wide, 0.30 high; PER and AER 0.44 wide, OAL 0.20; ratio AM:AL:PM:PL,

1.6:1.0:1.0:1.08, PM diameter 0.05. Clypeus 0.13 high, chelicerae 0.39 long. Sternum 0.61 long, 0.55 wide; labium 0.11 long, 0.20 wide; palpal coxae 0.21 long, 0.17 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.72 + 0.30 + 2.45 + 2.21 + 1.08 = [8.76]; II: 2.00 + 0.25 + 1.57 + 1.40 + 0.85 = [6.07]; III: 1.02 + 0.23 + 0.74 + 0.74 + 0.53 = [3.26]; IV: 1.59 + 0.28 + 1.23 + 1.02 + 0.57 = [4.69]; Palp: 0.23 + 0.10 + 0.14 + (absent) + 0.34 = [0.81]. Epigynum as in Figs. 18, 25, 26, MS slender, atrial furrows end at S; vulva as in Fig. 35, hyaline AD having small anteromedian fold, large anterior fold, and three small lateral folds before joining HS.

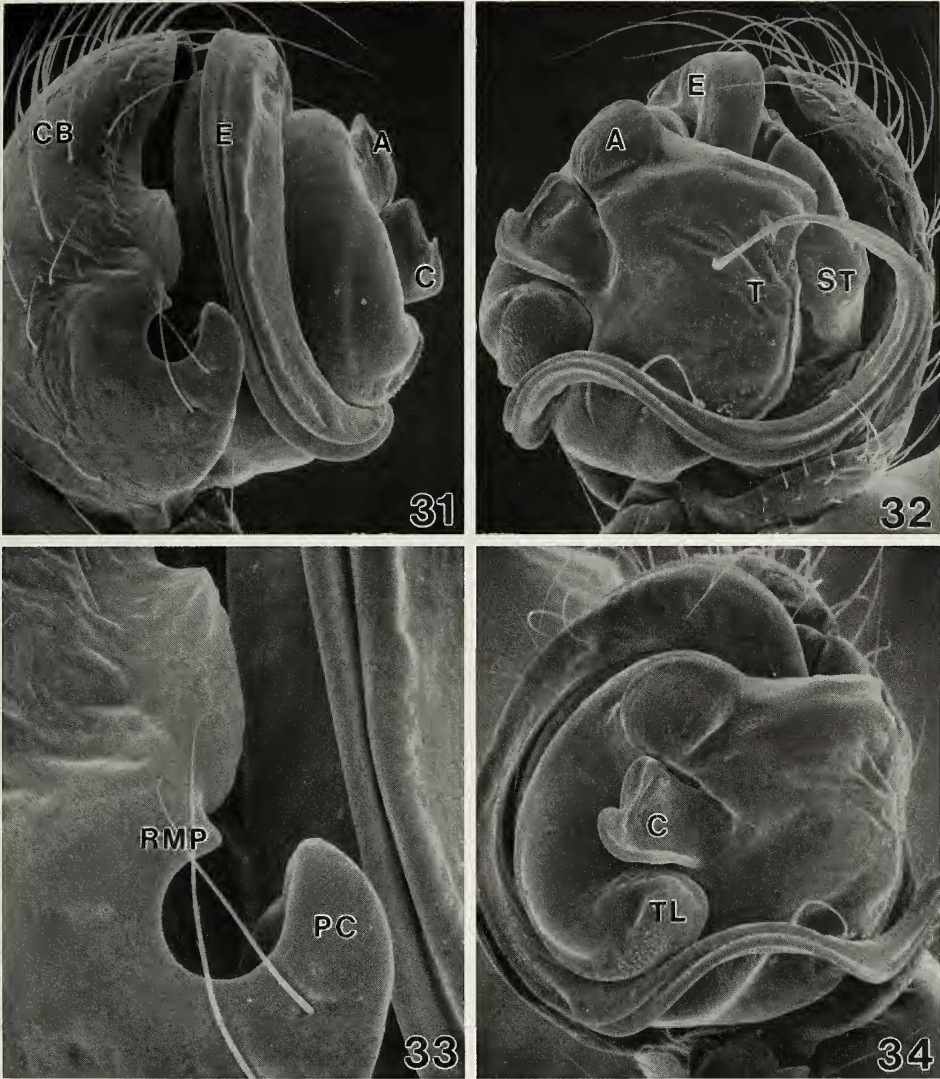
Variation: ($n = 3$). Total length 2.25–3.28; ratios of carapace length/width 1.49–1.54, height/width 0.45–0.49; ratios of PER/OQP 2.60–2.80, PER/OAL 2.11–2.33, OQP/OQA 0.88–0.94, PM-PL distance/PM diameter 1.64–1.80, diameter AM/PM 1.60–1.80; ratios of clypeal height/diameter AM 1.22–1.55, cheliceral length/clypeal height 3.08–3.18; ratio of sternum length/width 1.04–1.11; ratio of femur I length/carapace width 3.36–3.94. Dorsal longitudinal bands of abdomen narrow to broad, separate from to confluent with lateral longitudinal bands.

Natural History.—These spiders were common in wet montane forest. Individuals built sheet webs in low vegetation, rarely more than 30–40 cm from the forest floor.

Distribution.—Known only from the type locality, an isolated montane rain forest in northern Madagascar (Fig. 98).



Figures 25–30.—Epigyna of Cyatholipidae. 25, 27, 29. Ventral view; 26, 28, 30. Lateral view; 25, 26. *Ulwembua antsiranana* new species, Montagne d'Ambre; 27, 28. *Ulwembua ranomafana* new species, paratype; 29, 30. *Vazaha toamasina* new species, paratype. AT = atrium; CO = copulatory openings; EF = epigastric furrow; LL = lateral lobes; MH = median hood; ML = median lobe; MS = median septum; S = scape.



Figures 31–34.—Right male palpus of *Ulwembua ranomafana* new species, holotype. 31. Retrolateral view; 32. Proventral view; 33. Cymbial base, retrolateral view; 34. Ventral view. A = apical lobe of tegulum; C = conductor; CB = cymbium; E = embolus; PC = paracymbium; RMP = retromedian cymbial process; ST = subtegulum; T = tegulum; TL = ventromedian tegular lobe.

Additional material examined.—MADAGASCAR: *Antsiranana Province*: Parc National Montagne d'Ambre, 2.79 air km NE of park entrance, forest, (12°32'S, 49°10'E), elev. approx. 1000 m, 21–30 November 1993 (N. Scharff, C. Griswold, J. Coddington, S. Larcher and R. Andriamasamana), 31♂67♀, one pair in MRAC, remainder in CAS, USNM, and ZMUC.

Ulwembua ranomafana new species

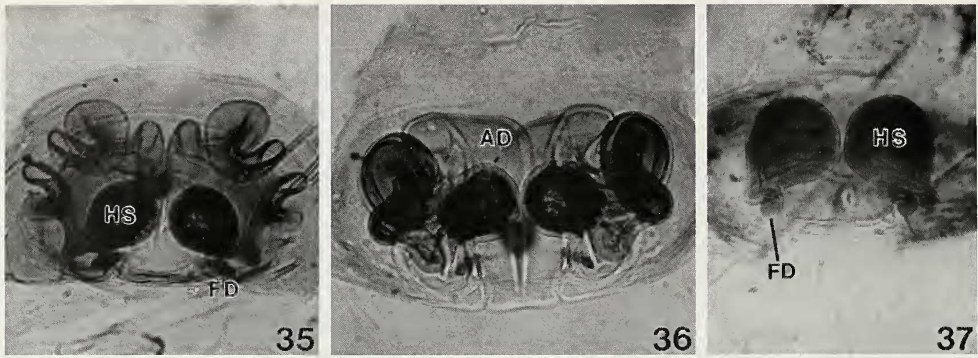
Figs. 15, 19–21, 27, 28, 31–34, 36, 39, 98

Types.—Male holotype and female paratype from forest at approximately 1100 m el-

evation at Vohiparara, Parc National de Ranomafana, Fianarantsoa Province, Madagascar, 7 December 1993, C. Griswold (CAS).

Etymology.—The type locality, a noun in apposition to the generic name.

Diagnosis.—Carapace dark except along lateral margins and on central longitudinal band extending from PM posteriorly to behind thoracic fovea (Fig. 39). Male with E weakly sinuate across tegulum base, C simple, median, longitudinal (Figs. 20, 34). Vulva with AD simpler than in *U. antsiranana* (Fig. 36).



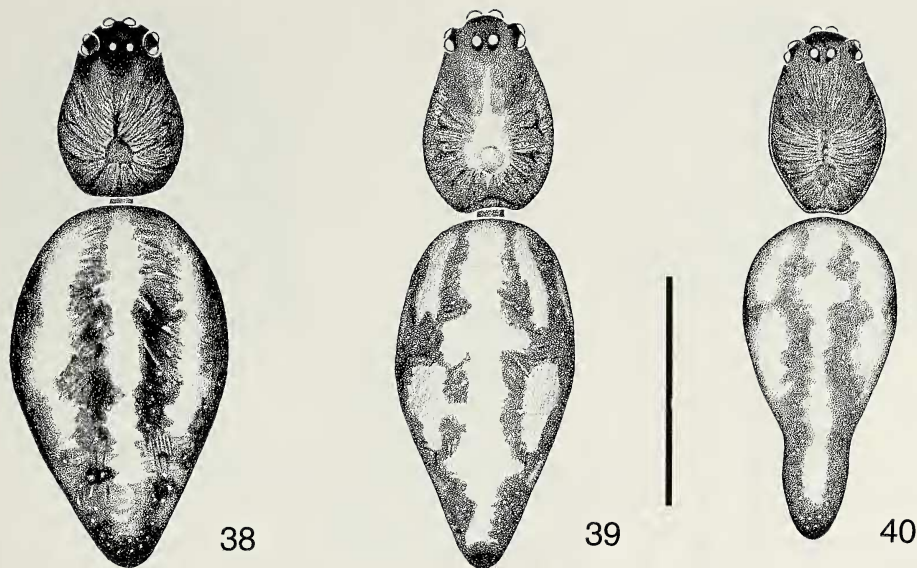
Figures 35–37.—Vulvae of Cyatholipidae, dorsal view, cleared. 35. *Ulwembua antsiranana* new species, Montagne d’Ambre; 36. *U. ranomafana* new species, paratype; 37. *Vazaha toamasina* new species, paratype. AD = afferent duct; FD = fertilization duct; HS = spermathecal head.

Description.—*Male (holotype)*: Total length 2.47. Carapace yellow-white, with broad dark gray dorsolateral bands extending from margins of pars cephalica to posterior margin, leaving narrow yellow-white band along lateral margin and broad central yellow-white band from pars cephalica to thoracic fovea; ocular area with black surrounding and extending between AM and extending posteriorly to surround each PM, and surrounding and extending between lateral eyes; clypeus yellow-brown, dark in center from AM to oral margin; chelicerae dark brown, palpal coxae, labium and sternum nearly black; coxae, trochanters, basal segments of palpi and bases of leg femora yellow-white, cymbium dark brown, legs shading distally to yellow-brown, unmarked except that apices of femora and tibiae are lighter; abdomen white, with black dorsolateral bands meeting posteriorly, each band encompasses narrow anterior and median oval white spots, venter gray, black from spinnerets to pedicel. Carapace 1.24 long, 0.80 wide, 0.36 high, texture finely granulate becoming denticulate posteriorly, posterior margin truncate, thoracic fovea a deep oval; PER 0.47 wide, AER 0.46 wide, OAL 0.22; ratio AM:AL:PM:PL, 1.23:1.08:1.0:1.23, PM diameter 0.07. Clypeus 0.18 high, chelicerae 0.37 long, with basal projection. Sternum 0.61 long, 0.55 wide, rugose; labium 0.11 long, 0.20 wide; palpal coxae 0.21 long, 0.17 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 3.74 + 0.34 + 3.51 + 3.72 + 1.49 = [12.80]; II: 2.47 + 0.30 + 1.94 + 2.04 + 0.96 = [7.71]; III: 0.96 + 0.21 + 0.79 + 0.79 + 0.49 = [3.24]; IV:

1.59 + 0.25 + 1.23 + 1.06 + 0.53 = [4.66]; Palp: 0.35 + 0.13 + 0.10 + (absent) + 0.40 = [0.98]. Abdomen unsclerotized except strongly between epigastric furrow and pedicel. Palp (Figs. 20, 21, 31–34) with cymbial RMP blunt, very short, PC broad in lateral view; tegulum apex bulging, smooth, TL small, denticulate in elongate oval patch; C simple.

Female (paratype): As in Figs. 15, 39. Total length 2.85. Markings and structure as in male except dorsal light marking of carapace broader, black dorsolateral bands of abdomen encompassing broad lateral white spots, anterior white spots confluent with median white band, venter gray. Carapace 1.05 long, 0.68 wide, 0.30 high, thoracic fovea a shallow oval; PER and AER 0.44 wide, OAL 0.20; ratio AM:AL:PM:PL, 1.6:1.2:1.0:1.3, PM diameter 0.05. Clypeus 0.13 high, chelicerae 0.39 long, with weak basal projection. Sternum 0.61 long, 0.55 wide; labium 0.11 long, 0.20 wide; palpal coxae 0.21 long, 0.17 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.51 + 0.28 + 2.13 + 2.13 + 1.04 = [8.09]; II: 1.55 + 0.23 + 1.13 + 1.21 + 0.70 = [4.82]; III: 0.79 + 0.17 + 0.51 + 0.45 + 0.42 = [2.34]; IV: 1.28 + 0.23 + 0.91 + 0.79 + 0.49 = [2.34]; Palp: 0.24 + 0.10 + 0.13 + (absent) + 0.33 = [0.80]. Epigynum as in Figs. 19, 27, 28; MS between CO broad, atrial furrows end just behind S; vulva as in Fig. 36, hyaline AD having broad anteromedian chamber and forming large lateral and posterolateral folds before joining HS.

Variation: ($n = 3$). Total length 2.72–3.19;



Figures 38–40.—Female Cyatholipidae, dorsal views. 38. *Ulwembua antsiranana* new species, Montagne d'Ambre; 39. *U. ranomafana* new species, paratype; 40. *Vazaha toamasina* new species, paratype. (Scale bar = 1 mm)

ratios of carapace length/width 1.39–1.50, height/width 0.38–0.50; ratios of PER/OQP 2.35–2.62, PER/OAL 1.95–2.21, OQP/OQA 0.89–1.00, PM-PL distance/PM diameter 1.07–1.33, diameter AM/PM 1.14–1.50; ratios of clypeal height/diameter AM 1.44–1.50, cheliceral length/clypeal height 2.61–3.00; ratio of sternum length/width 1.00–1.14; ratio of length femur I/carapace width 3.57–3.71.

Distribution.—Known only from the type locality in montane rain forest (Fig. 98).

Additional material examined.—MADAGASCAR: *Fianarantsoa Province*: Parc National de Ranomafana, Vohiparara, ca. 21°14'S, 47°24'E, elev. 1100 m, 5–7 November 1993 (N. Scharff, S. Larcher, C. Griswold, and R. Andriamasamanana) 2♀ (ZMUC, USNM).

Vazaha new genus

Type species.—*Vazaha toamasina* new species

Etymology.—From the Malagasy for foreigner; gender feminine.

Diagnosis.—Female epigynum (Figs. 29, 30, 43) with S but lacking MH, male palp with cymbial RMP directed distad (Figs. 45, 48); E thick, lacking PP.

Description.—See under species description below of *Vazaha toamasina* new species.

Composition.—One species.

Distribution.—Madagascar (Fig. 98).

Vazaha toamasina new species Figs. 29, 30, 37, 40–48, 98

Types.—Male holotype and female paratype from forest at an elevation of 1000 m at Parc National Perinét, Toamasina Province, Madagascar, 4–5 November 1993, C. E. Griswold (CAS).

Etymology.—From the home province, a noun in apposition to the generic name.

Diagnosis.—See generic diagnosis above.

Description.—*Male (holotype)*: As in Figure 41. Total length 2.38. Carapace dusky yellow-brown, pale yellow-brown in center behind pars cephalica surrounding thoracic fovea, ocular area dusky, dark grey surrounding AME; clypeus and chelicerae dusky grey-brown, unmarked, palpal coxae, labium and sternum dark grey-brown; coxae and trochanters white, legs shading from white at base to pale yellow-brown from distal femora to tarsi, palpi white except for grey-brown cymbium; abdomen pale grey, dorsum with median pair of longitudinal dark bands that meet posteriorly outlining median white area and laterally outlining an anterior and median light longitudinal spot, venter dark grey from pedicel to beyond spinnerets, weakly sclerotized ventrally between pedicel and epigastric furrow,

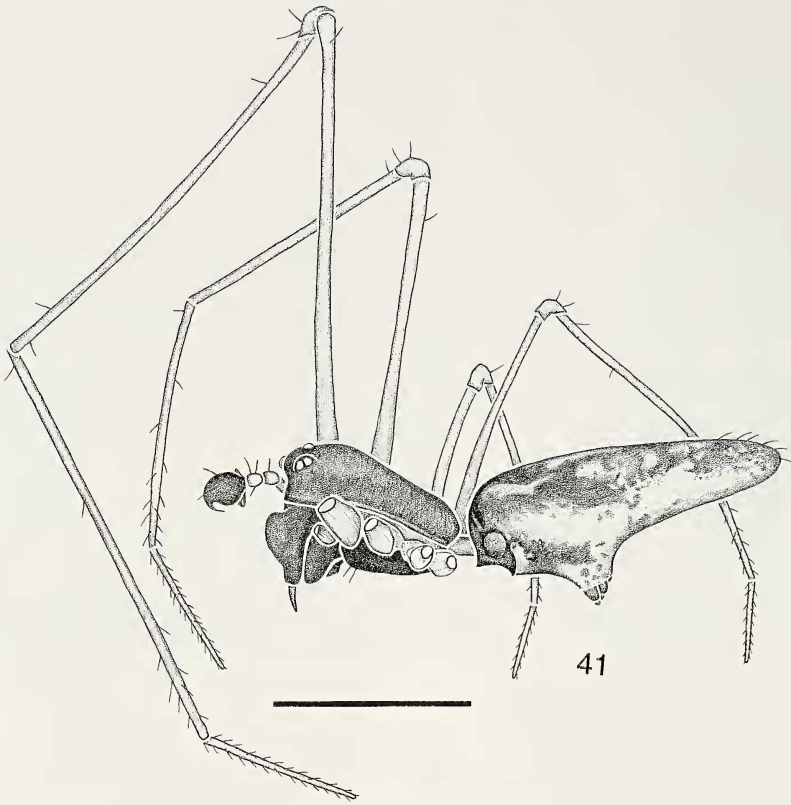


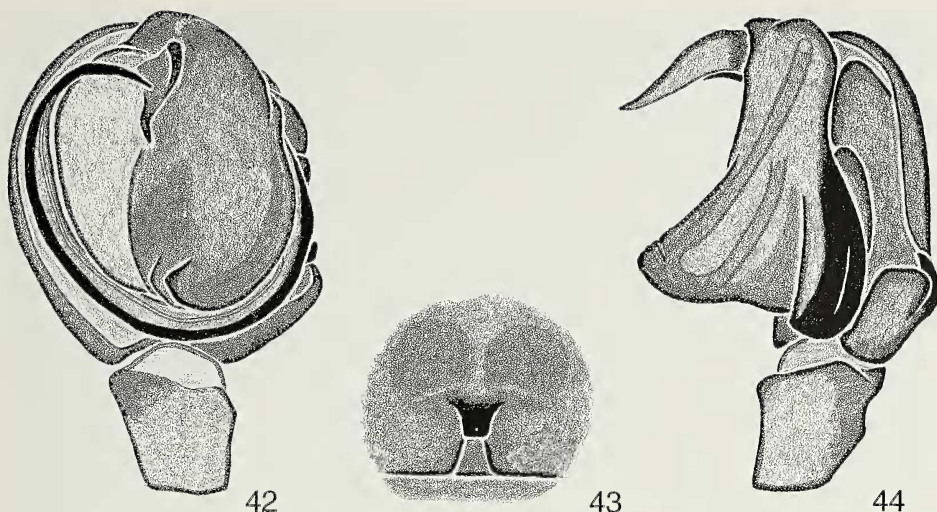
Figure 41.—*Vazaha toamasina* new species, holotype male, lateral view. (Scale bar = 1 mm)

otherwise unsclerotized, abdominal setae fine, with small setal base picks on anterior margin. Carapace 1.09 long, 0.68 wide, 0.35 high, oval in dorsal view, posterior margin weakly concave, finely rugose, thoracic fovea a shallow oval; PER and AER 0.43 wide, OAL 0.20; ratio AM:AL:PM:PL, 1.0:1.33:1.0:0.92, PM diameter 0.06. Clypeus 0.16 high, chelicerae 0.46 long, with large antieriad-directed basal projection. Sternum 0.60 long, 0.55 wide, finely granulate; labium 0.11 long, 0.18 wide; palpal coxae 0.21 long, 0.16 wide; leg coxae surrounded by unsclerotized cuticle. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.64 + 0.23 + 2.38 + 2.36 + (missing) = [?]; II: 1.94 + 0.25 + 1.59 + 1.57 + 0.81 = [6.16]; III: 0.89 + 0.21 + 0.68 + 0.68 + 0.47 = [2.93]; IV: 1.42 + 0.23 + 1.00 + 1.00 + 0.49 = [4.14]; Palp: 0.33 + 0.13 + 0.08 + (absent) + 0.26 = [0.80]. Palp (Figs. 42, 44–48) with cymbial RMP short, narrow, directed distad, PC broad and blunt in lateral view; tegulum apex a small, pointed lobe, TL pointed, weakly wrin-

kled; C a distal, simple, elongate basad-directed triangle; E stout, arising near 2 o'clock, PP absent.

Female (paratype): As in Fig. 40. Total length 2.21. Markings as in male. Carapace 1.01 long, 0.70 wide, 0.31 high; PER 0.40 wide, AER 0.38 wide, OAL 0.19; ratio AM:AL:PM:PL, 1.17:1.0:1.0:1.0, PM diameter 0.06. Clypeus 0.11 high, chelicerae 0.39 long, with small antieriad-directed basal projection. Sternum 0.59 long, 0.51 wide, texture nearly smooth; labium 0.14 long, 0.18 wide; palpal coxae 0.21 long, 0.15 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.29 + 0.25 + 1.91 + 1.91 + 0.91 = [7.27]; II: 1.62 + 0.28 + 1.28 + 1.28 + 0.72 = [5.18]; III: 0.74 + 0.21 + 0.57 + 0.57 + 0.42 = [2.51]; IV: 1.28 + 0.21 + 0.96 + 0.81 + 0.47 = [3.73]; Palp: 0.25 + 0.08 + 0.11 + (absent) + 0.28 = [0.72]. Epigynum as in Figs. 29, 30, 43, with S but lacking MH; vulva as in Fig. 37, CO lead directly to large, sclerotized HS, AD absent.

Variation: ($n = 2$). Total length 2.21–2.81;



Figures 42-44.—Genitalia of *Vazaha toamasina* new species. 42, 44. Left male palpus, holotype; 43. Epigynum, paratype; 42, 43. Ventral view; 44. Retrolateral view.

ratios of carapace length/width 1.43–1.51, height/width 0.43–0.45; ratios of PER/OQP 2.53–2.78, PER/OAL 2.11–2.17, OQP/OQA 0.87–1.00, diameter AM/PM 1.17–1.45; ratios of clypeal height/diameter AM 1.25–1.57, cheliceral length/clypeal height 3.36–4.00; ratio of length femur I/carapace width 3.22–3.35.

Distribution.—Known only from the type locality on the eastern escarpment in central Madagascar (Fig. 98).

Additional material examined.—MADAGASCAR: *Toamasina Province*, Parc National Perinét, near Andasibe, 18°56'S, 48°24'E, elev. 1000 m, 4–5 November 1993 (C. Griswold) 2♀ (CAS).

Alaranea new genus

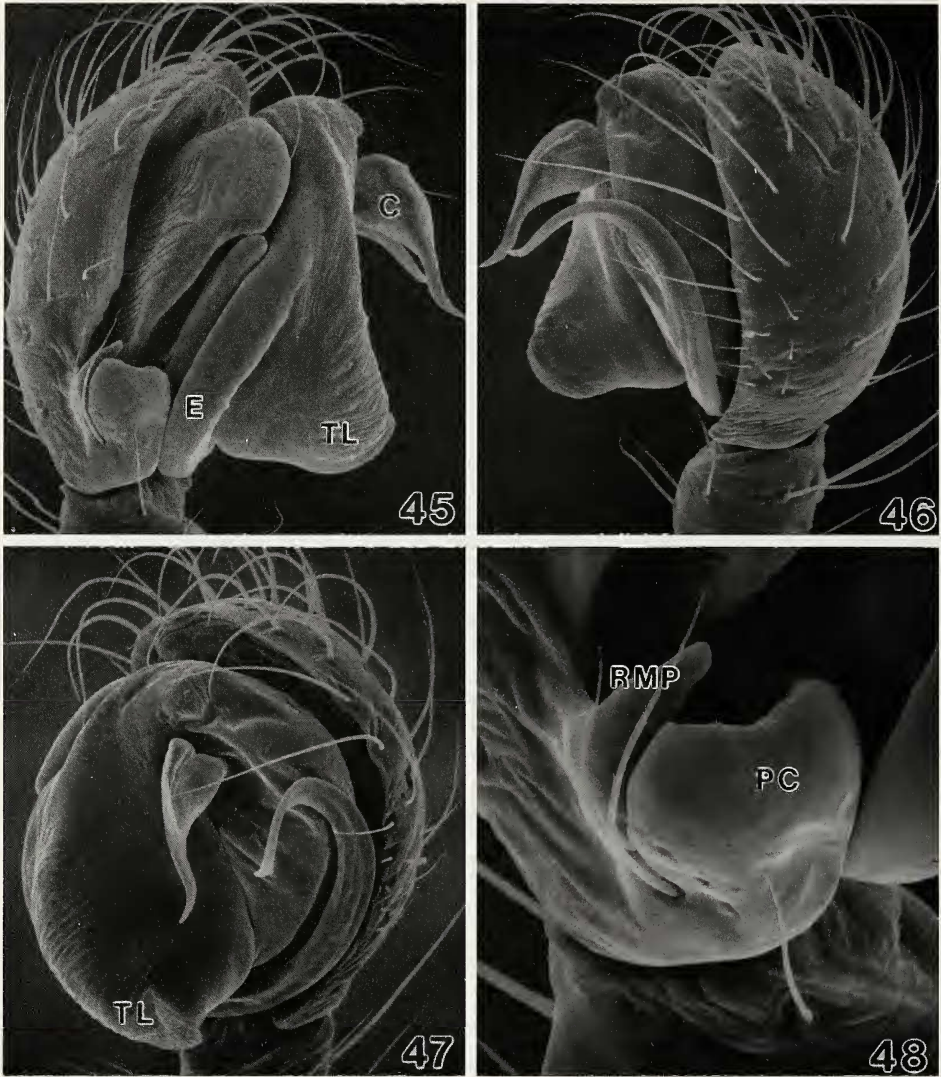
Type species.—*Alaranea merina* new species.

Etymology.—Combination of Malagasy Ala, and Latin Aranea, both meaning spiders, considered feminine.

Diagnosis.—Anterior portion of abdomen of both sexes forming a sclerotized, annulate petiole produced dorsally into a short projection or horn (Figs. 4, 66, 94); abdomen of males with a thin, shiny transparent dorsal scutum (Fig. 95); PP present (Figs. 53, 57, 73, 89).

Description.—Total length 1.60–3.00. Carapace of most species narrowly trapezoidal in dorsal view (Figs. 63, 66, 95, 96), oval in *A. alba* new species (Fig. 69), length 1.39–1.67

times width, low, maximum height 0.38–0.52 times width; texture finely rugose (Fig. 50), thoracic fovea a small, round pit, carapace posterior margin weakly concave medially, forming weakly upturned lip; ocular area with PER width 1.83–2.56 times OAL, 2.14–2.69 times OQP, OQP 0.81–1.11 times OQA; diameter AM 1.00–1.60 times PM, distance PM-PL 0.80–1.50 times PM diameter; clypeal height 1.11–2.40 times AM diameter, cheliceral length 1.93–3.80 times clypeal height (Fig. 51); chelicerae unmodified. Sternum rugose (Fig. 49) to pustulate, length 0.88–1.15 times width, plural and sternal sclerotizations extend between and surround coxae (Figs. 2, 68, 94). Abdomen sclerotized from epigastric furrow to and surrounding pedicel (Figs. 63–69), sclerotization forming annulate petiole produced dorsally into a short projection or horn (Figs. 4, 94), anterior sclerotization much broader in males, males with a thin, shiny transparent dorsal scutum (Fig. 95), abdomen otherwise unsclerotized, oval to triangular; abdominal setae short, slender, bases of anterior setae unmodified. Legs short, femur I length 1.63–2.11 times carapace width, unmodified (Figs. 68, 94). Male palpus (Figs. 57–62) with cymbial RMP pointing ventrad, smaller than PC; palpal bulb with dentate TL, apex a small, smooth to pustulate lobe; C median, longitudinal, simple or with accessory process, smooth or rarely dentate; E thick, making sim-



Figures 45–48.—*Vazaha toamasina* new species, holotype male, right palpus. 45. Retrolateral view; 46. Prolateral view; 47. Ventral view; 48. Cymbial base, retrolateral view. C = conductor; E = embolus; PC = paracymbium; RMP = retromedian cymbial process; TL = ventromedian tegular lobe.

ple curve, origin apical between 10–11 o'clock, ridged; PP present, fleshy, pustulate, with or without teeth, thick or hooked apically; sperm duct with tight double twist (curl-cue) near embolic base. Epigynum (Figs. 55, 56, 74–77) with S and long MH with slender MS between CO, ML parallel-sided. Vulva (Figs. 90–93) with sclerotized, simple hemispherical lateral AD, in most specimens larger than HS, FD posterior.

Composition.—Four species.

Distribution.—Madagascar (Fig. 98).

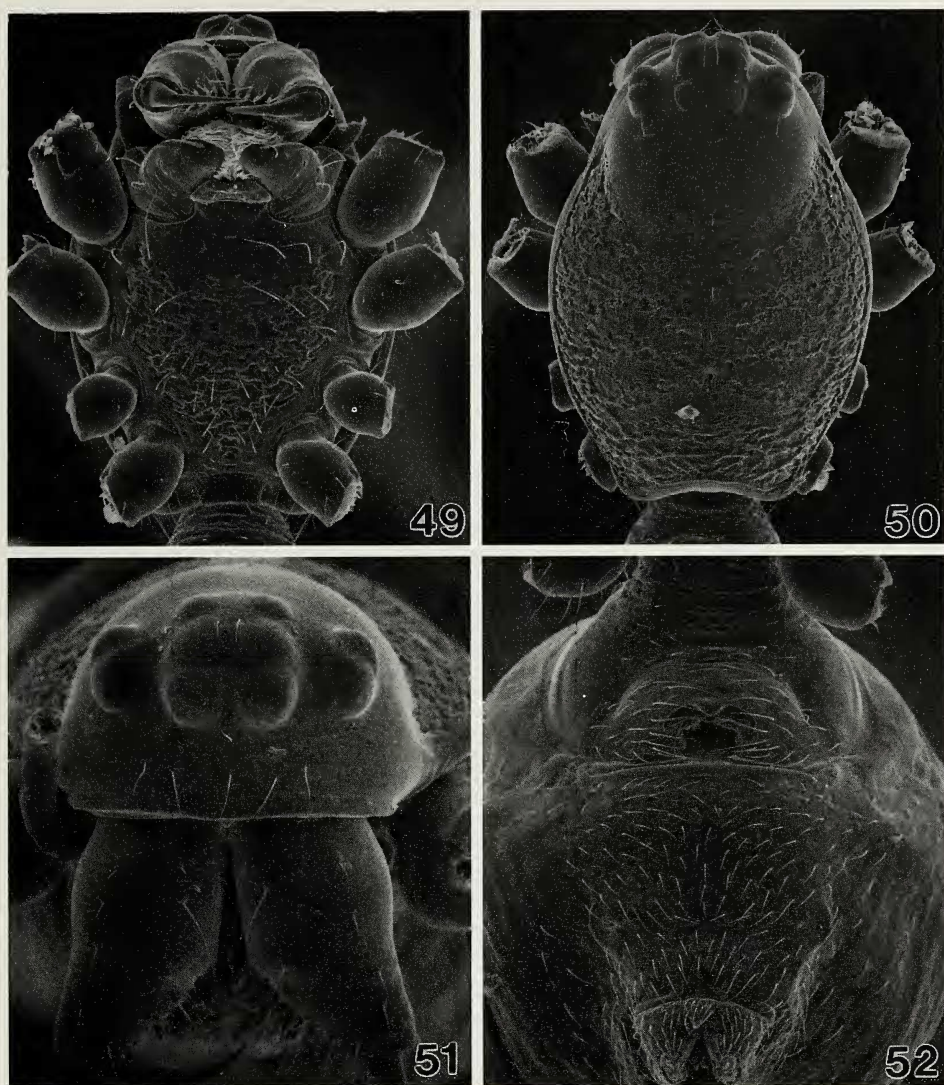
Alaranea betsileo new species

Figs. 2–4, 6–14, 49–54, 56, 59–64, 74, 75, 90, 98

Types.—Male holotype and female paratype from Madagascar, Fianarantsoa Province, Parc National Ranomafana, Talatakely, montane rain forest, 21°15'S, 47°25'E, elev. 900 m, 5–7 November 1993 (C. Griswold) (CAS).

Etymology.—Named for the indigenous people of Fianarantsoa Province.

Diagnosis.—Conductor bipartite, with thin, broad proximal piece separate from C proper

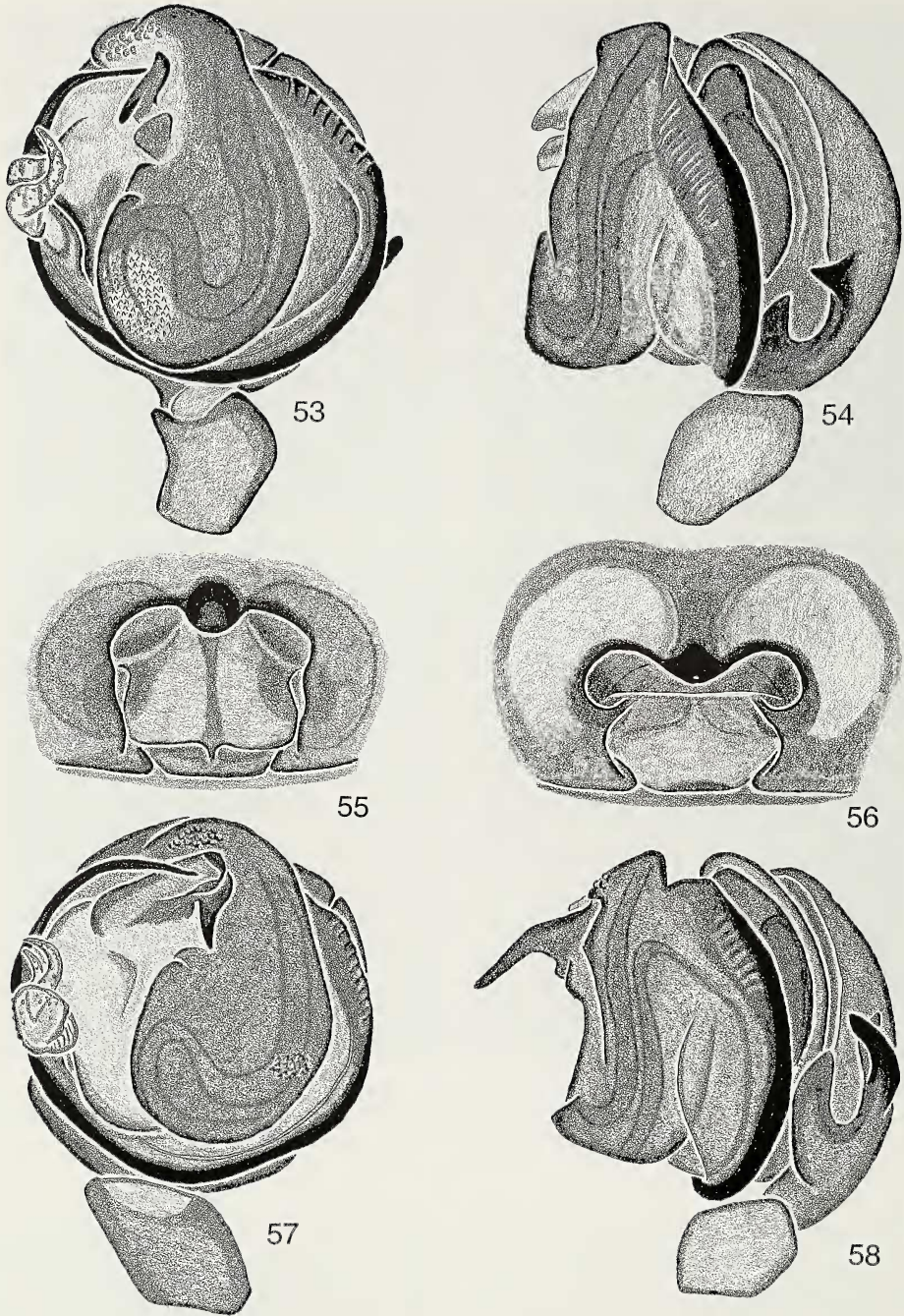


Figures 49–52.—Morphology of *Alaranea betsileo* new species, from Talatakely. 49. Carapace, ventral view; 50. Carapace, dorsal view; 51. Carapace, anterior view; 52. Abdomen, ventral view; 49, 50. Male; 51, 52. Female.

(Figs. 53, 61); in both sexes sternum dark red-brown to black, abdomen of most specimens with extensive dark markings, dorsum lacking sinuate longitudinal dark bands, with median black band surrounding 1–2 anterior white spots (Figs. 63, 64).

Description.—*Male* (7 km W Ranomafana): Total length 2.24. Carapace dark red-brown, unmarked, ocular area with diffuse dark grey surrounding AM, black surrounding AL-PL; clypeus dusky grey in center, chelicerae red-brown, with faint dark anterobasal streaks; palpal coxae red-brown, lighter at

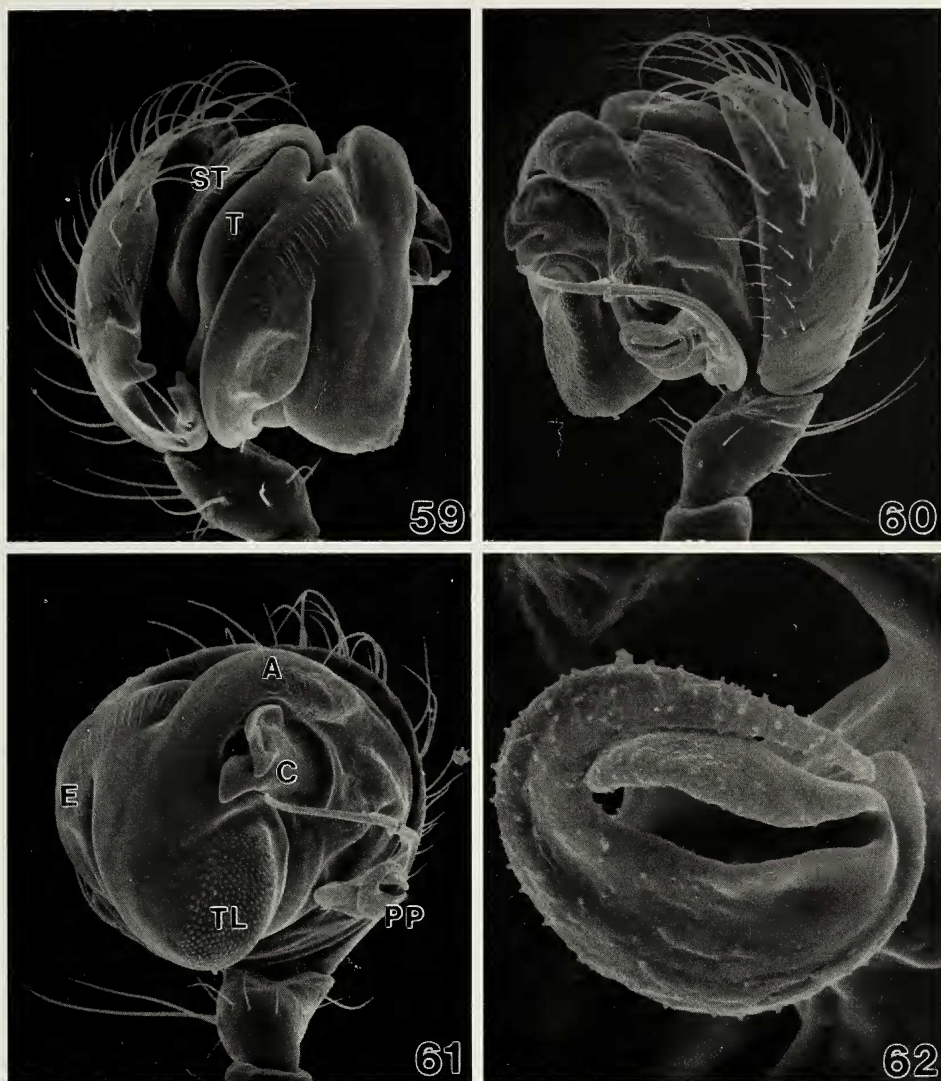
tips; labium and sternum dark brown to nearly black; coxae, legs, and palpi yellow-white, unmarked, cymbium dusky yellow-brown; abdomen black dorsally beneath shiny transparent scutum, dark transverse bands extending laterally from midpoint and posterior, those in middle nearly meeting ventrally, dark brown sclerotization extending from epigastric furrow to and surrounding pedicel to form annulate petiole, sclerotization very broad anterodorsally. Carapace 1.04 long, 0.64 wide, 0.26 high, trapezoidal in dorsal view; PER 0.38 wide, AER 0.39 wide, OAL 0.19; ratio AM:



Figures 53–58.—Genitalia of *Alaranea* spp. 53, 54, 57, 58. Left male palpus; 55, 56. Epigynum; 53, 55–57. Ventral view; 54, 58. Retrolateral view; 53, 54, 56. *Alaranea betsileo* new species, from 7 km W Ranomafana; 55. *A. alba* new species, paratype; 57, 58. *A. alba* new species, holotype.

AL:PM:PL, 1.33:1.0:1.0:1.0, PM diameter 0.06. Clypeus 0.14 high, chelicerae 0.33 long. Sternum 0.50 long, 0.50 wide; labium 0.10 long, 0.14 wide; palpal coxae 0.16 long, 0.12

wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.60 + 0.42 + 2.08 + 2.20 + 1.36 = [8.66]; II: 2.32 + 0.40 + 2.32 + 1.96 + 1.28 = [8.28];



Figures 59–62.—*Alaranea betsileo* new species, male from Talatakely, right palpus. 59. Retrolateral view; 60. Prolateral view; 61. Ventral view; 62. Parembolic process. A = apical lobe of tegulum; C = conductor; E = embolus; PP = parembolic process; ST = subtegulum; T = tegulum; TL = ventromedian tegular lobe.

III: $1.48 + 0.36 + 1.48 + 1.04 + 0.80 = [5.16]$; IV: $2.20 + 0.40 + 1.72 + 1.56 + 0.88 = [6.76]$; Palp: $0.28 + 0.10 + 0.09 + (\text{absent}) + 0.24 = [0.71]$. Palp (Figs. 53, 54, 59–62) with cymbial RMP short, acutely pointed, with distal blunt projection, PC broad in lateral view; tegulum apex pustulate, TL large, convex, dentation extensive; C large, double, with flattened translucent lower article nearly as large as C proper; PP with apical recurved hook.

Variation: ($n = 3$). Total length 2.12–2.61;

ratios of carapace length/width 1.54–1.62, height/width 0.39–0.42; ratios of PER/OQP 2.37–2.53, PER/OAL 1.85–2.16, OQP/OQA 0.88–0.94 distance PM-PL/diameter PM 1.14–1.40, diameter AM/PM 1.00–1.60; ratios of clypeal height/AM diameter 1.62–1.86, cheliceral length/clypeal height 2.36–2.46; ratio of sternum length/width 0.88–1.00; ratio of length femur I/carapace width 1.87–2.07. Markings of carapace dark brown to nearly black; legs pale yellow white to dusky gray; abdomen with dorsolateral transverse

marks entire to broken to rarely absent, dorsal black area ranges from narrow median band to totally covering dorsum.

Female (7 km. W Ranomafana): Total length 2.24. Carapace red-brown, dusky on pars cephalica and around thoracic fovea, with median yellow-brown area between thoracic fovea and posterior margin of pars cephalica, ocular area dark grey between AM-PM and AL-PL, dusky marking extending below AM to lower margin of clypeus; chelicerae and palpal coxae yellow-brown, unmarked; labium and sternum dark brown to black; coxae, legs, and palpi yellow-white, unmarked; abdomen yellow-white, dorsum with broad longitudinal black mark, this mark forming lateral transverse bands near middle, small black spot at posterior apex, venter yellow-white, unmarked; dark brown sclerotization extending from epigastric furrow to and surrounding pedicel to form annulate petiole, sclerotization much less extensive anteriorly than in male. Carapace 0.94 long, 0.60 wide, 0.25 high; PER 0.37 wide, AER 0.36 wide, OAL 0.18; ratio AM:AL:PM:PL, 1.6:1.2:1.0:1.2, PM diameter 0.06. Clypeus 0.11 high, chelicerae 0.28 long. Sternum 0.50 long, 0.47 wide; labium 0.10 long, 0.16 wide; palpal coxae 0.17 long, 0.12 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: $2.24 + 0.44 + 1.80 + 1.72 + 1.06 = [7.26]$; II: $2.00 + 0.42 + 1.60 + 1.48 + 1.02 = [6.52]$; III: $1.24 + 0.36 + 0.92 + 0.84 + 0.76 = [4.12]$; IV: $1.84 + 0.40 + 1.36 + 1.20 + 0.78 = [5.58]$; Palp: $0.21 + 0.09 + 0.11 + (\text{absent}) + 0.22 = [0.63]$. Epigynum as in Figs. 56, 74, 75; vulva as in Fig. 90.

Variation: ($n = 3$). Total length 2.18–2.89; ratios of carapace length/width 1.56–1.69, height/width 0.34–0.43; ratios of PER/OQP 1.91–2.30, PER/OAL 1.28–2.00, OQP/OQA 0.80–1.00, distance PM-PL/PM diameter 1.28–2.00, diameter AM/PM 1.14–1.67; ratios of clypeal height/AM diameter 1.40–2.00, cheliceral length/clypeal height 2.22–3.71; ratio of sternum length/width 1.03–1.10; ratio of length femur I/carapace width 1.92–2.17. Carapace of most specimens dark brown to black, in rare specimens orange-brown, unmarked; dorsal abdominal dark markings range from narrow, broken laterally (Fig. 63) to broad, almost obscuring dorsum (Fig. 64), anteromedian white spot rarely obscure.

Natural history.—Common inside forest

hanging beneath sheet webs between 0.2–2 m above ground.

Distribution.—Known only from montane forests near Ranomafana in Fianarantsoa Province (Fig. 98).

Material examined.—**MADAGASCAR:** *Fianarantsoa Province:* Parc National Ranomafana, Talatakely, montane rain forest, 21°15'S, 47°25'E, elev. 900 m, 34♂74♀ (including holotype and paratype), 5–7 November 1993 (N. Scharff, S. Larcher, C. Griswold, and R. Andriamasamanana) (one pair in MRAC, remainder divided among CAS, USNM, and ZMUC). Parc National Ranomafana, Vohiparara, 21°14'S, 47°24'E, elev. 900 m, 6♂6♀, 5–7 December 1993 (N. Scharff, S. Larcher, C. Griswold, and R. Andriamasamanana) (CAS, ZMUC, USNM); Parc National Ranomafana, 200 m N research Cabin, trail G, beating, 1♂2♀ (CAS) 2♂2♀ (MCZ), 23 March 1992 (S. Kariko, V. Roth); Parc National Ranomafana, beating in forest, 1♂4♀ (CAS), 4♂12♀ (MCZ), 25 March 1992 (Emile); Parc National Ranomafana, 200 m N research Cabin, trail G, beating, 2♂4♀, 25 March 1992 (B. Roth) (CAS); Parc National Ranomafana, 21°12'S, 47°27'E, from foliage, elev. 1000 m, 4♀ (CAS) 3♀ (MCZ) April 1992 (V. & B. Roth); Parc National Ranomafana, 7 km W Ranomafana, elev. 900 m, 21°12'S, 47°27'E, 2♂, 20–24 March 1990, elev. 1100 m, 1♂1♀, 8–21 October 1988, 1♂, 21–30 October 1988, 2♂, 1–7 November 1988 (W. Steiner) (USNM).

Alaranea merina new species

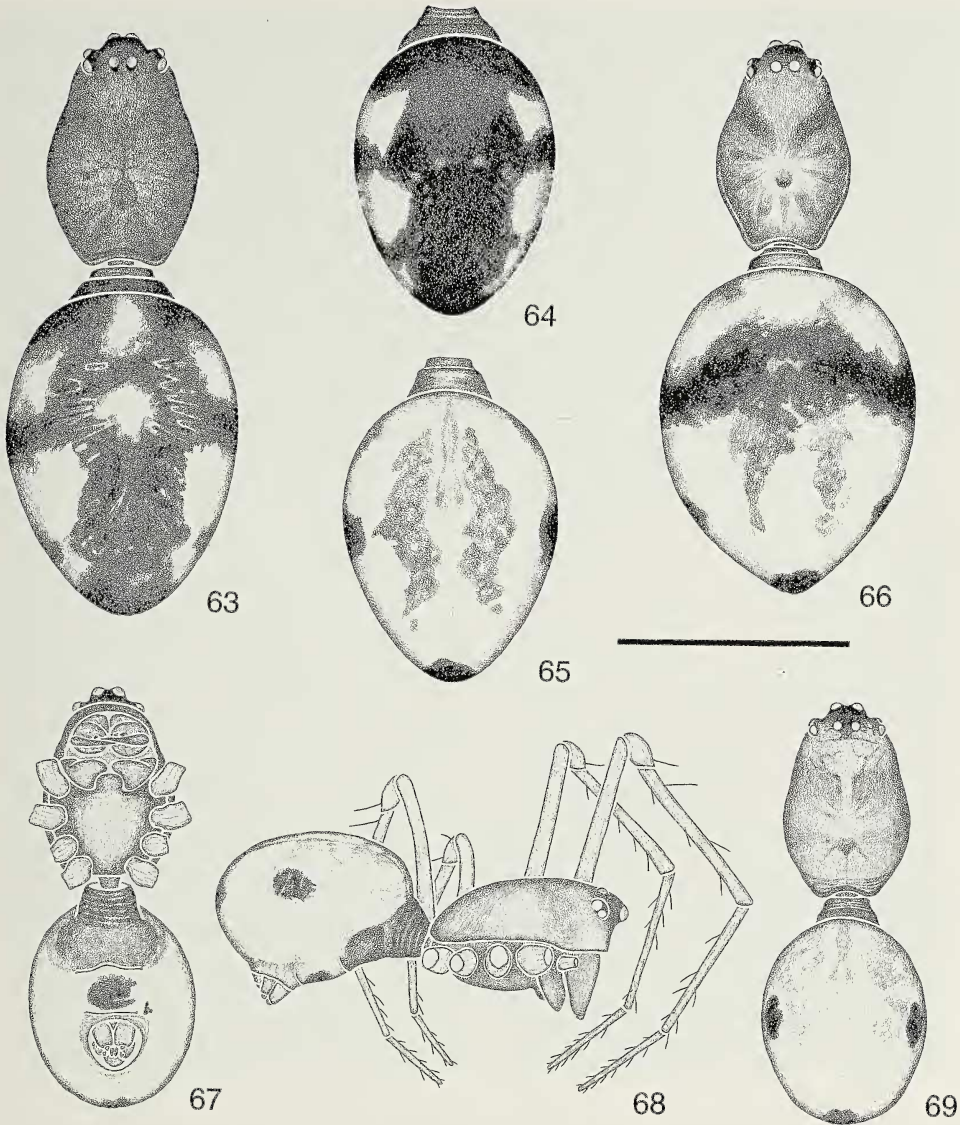
Figs. 5, 65, 66, 70–73, 76, 77, 91, 98

Types.—Male holotype and female paratype from Madagascar, Toamasina Province, Parc National Perinét, near Andasibe, 18°56'S, 48°24'E, elev. 1000 m, montane rain forest, 4–5 November 1993 (C.E. Griswold) (CAS).

Etymology.—Named for the indigenous people of Antananarive Province.

Diagnosis.—Conductor simple, proximal point narrower than cup (Figs. 70–72); dorsum of abdomen with sinuate longitudinal dark bands diverging from apex to middle and converging posteriorly (Figs. 65, 66). There seem to be no consistent characters to separate females of *merina* new species from *ardua* new species, though in the former the carapace is pale yellow-brown with darker markings along the borders of the pars cephalica (Fig. 66), whereas the carapace of *ardua* tends to be darker (Fig. 96).

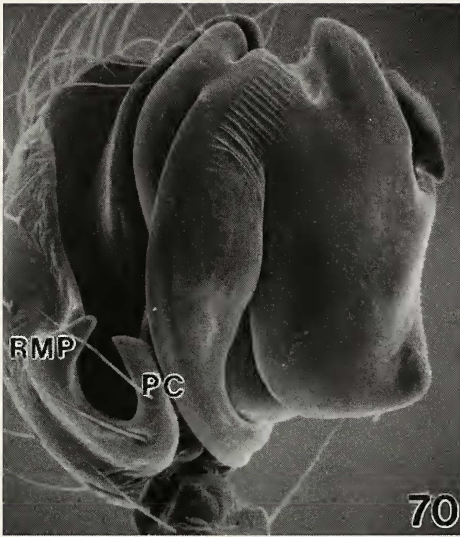
Description.—*Male* (7 km. W Ranomafana): Total length 2.32. Carapace yellow-



Figures 63-69.—Morphology of *Alaranea* spp. 63-66, 69. Dorsal view, 64 and 65 abdomen only; 67. Ventral view; 68. Lateral view; 63, 64. *Alaranea betsileo* new species, females from Talatakely; 65, 66. *Alaranea merina* new species, females from Perinét; 67-69. *Alaranea alba* new species, holotype male. (Scale bar = 1 mm)

brown, brown along margins of pars cephalica and on thoracic fovea; ocular area dark grey beginning just anterior of PER, black between AM and AL-PL; clypeus yellow-brown, dark grey in center from AM to clypeal margin; chelicerae and palpal coxae orange-brown; sternum and labium black; legs and palpi yellow-white, unmarked, cymbium yellow-brown, tegulum orange-brown; abdomen white, with brown sclerotization extending from epigastric furrow to and surrounding

pedicel to form annulate petiole, dorsum with faint longitudinal brown bands beneath transparent scutum, with dorsolateral elongate black spot and posterior lateral wavy line, posterior apex with black spot, venter dark gray between epigastric furrow and spiracle. Carapace 1.00 long, 0.64 wide, 0.28 high, trapezoidal in dorsal view; PER 0.39 wide, AER 0.38, OAL 0.19; ratio AM:AL:PM:PL 1.5:1.17:1.0:1.17, PM diameter 0.06. Clypeus 0.12 high, chelicerae 0.30 long. Sternum 0.50

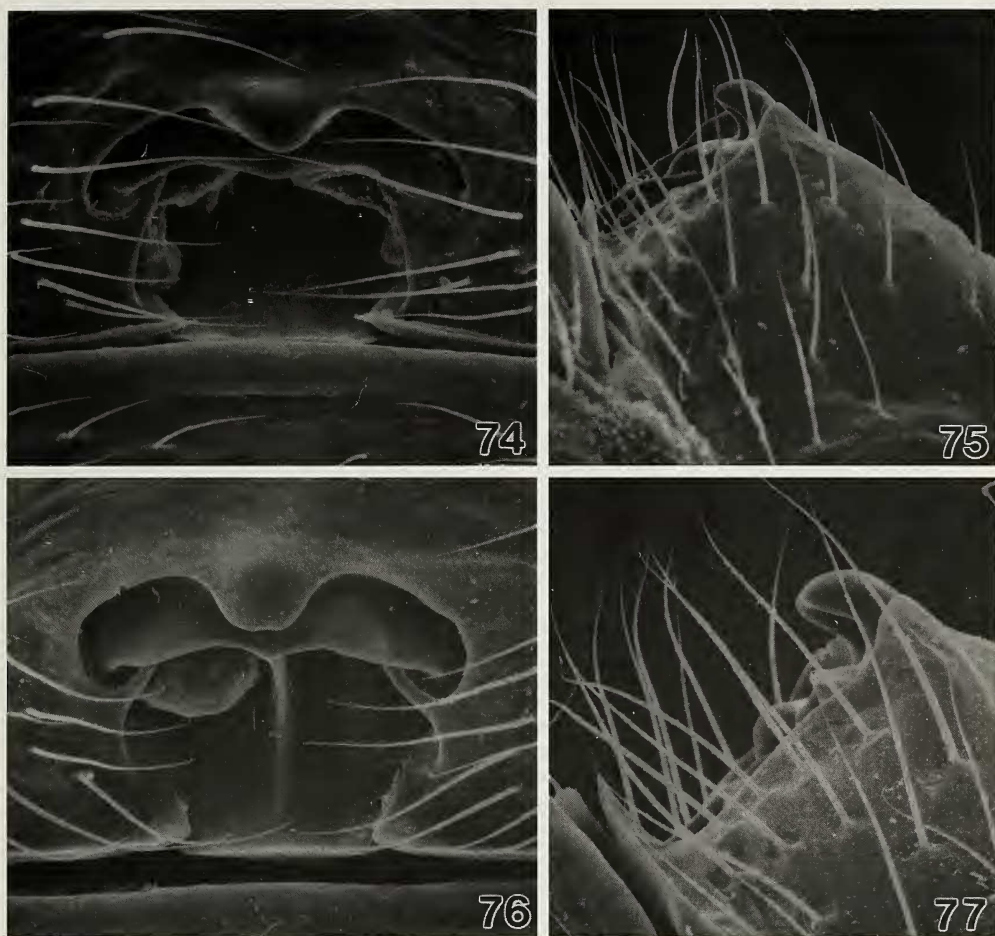


Figures 70–73.—*Alaranea merina* new species, male from Perinét, right palpus. 70. Retrolateral view; 71. Prolateral view; 72. Ventral view; 73. Parembolic process. PC = paracymbium; RMP = retromedian cymbial process.

long and wide; labium 0.12 long, 0.15 wide; palpal coxae 0.18 long, 0.14 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: $2.44 + 0.44 + 1.96 + 1.84 + 1.08 = [7.76]$; II: $2.12 + 0.44 + 1.72 + 1.72 + 0.96 = [6.96]$; III: $1.30 + 0.38 + 1.00 + 0.96 + 0.64 = [4.28]$; IV: $2.00 + 0.40 + 1.48 + 1.40 + 0.72 = [6.00]$; Palp: $0.32 + 0.14 + 0.10 + (\text{absent}) + 0.26 = [0.82]$. Palp (Figs. 70–73) with bulb marked as in *Alaranea betsileo* new species (Figs. 53, 54), cymbial RMP simple, pointed, PC slender in lateral view; tegulum apex strongly pustu-

late, TL large, projecting ventrally to form blunt point, denticulate over large area; C small, single; PP with apical recurved hook.

Variation: ($n = 3$). Total length 2.29–2.71; ratios of carapace length/width 1.53–1.67, height/width 0.34–0.47; ratios of PER/OQP 2.18–2.44, PER/OAL 2.00–2.09, OQP/OQA 0.82–1.00, distance PM-PL/diameter PM 1.00–1.67, diameter AM/PM 1.25–1.67; ratios of clypeal height/AM diameter 1.36–1.60, cheliceral length/clypeal height 2.55–3.28; ratio of sternum length/width 1.03–1.11; ratio of length femur I/carapace width 1.89–2.12. Car-



Figures 74–77.—Epigyna of *Alaranea* spp. 74, 76. Ventral view; 75, 77. Lateral view; 74, 75. *Alaranea betsileo* new species, Talatakely; 76–77. *Alaranea merina* new species, Perinét.

apace with or without faint dusky radii extending from thoracic fovea; abdominal dorsum (Figs. 65, 66) clear with dorsolateral markings visible to obscured to varying degrees by black, these markings range from median transverse band or U to large dark area, lateral black marks present or absent.

Female (7 km. W Ranomafana): Total length 2.28. Markings as in male except abdomen having dorsomedian brown bands fainter, lateral black spots larger, and posterior spot smaller. Carapace 0.92 long, 0.58 wide, 0.24 high; PER 0.33 wide, AER 0.36 wide, OAL 0.18; ratio of eyes AM:AL:PM:PL: 1.6:1.2:1.0:1.2, PM diameter 0.06. Clypeus 0.11 high, chelicerae 0.28 long. Sternum 0.46 long, 0.48 wide; labium 0.11 long, 0.14 wide; palpal coxae 0.17 long, 0.12 wide. Leg measurements (femur + patella + tibia + metatarsus

+ tarsus = [Total]): I: 2.24 + 0.44 + 1.80 + 1.72 + 1.06 = [7.26]; II: 2.00 + 0.42 + 1.60 + 1.48 + 1.02 = [6.52]; III: 1.24 + 0.36 + 0.92 + 0.84 + 0.76 = [4.12]; IV: 1.84 + 0.40 + 1.36 + 1.20 + 0.78 = [5.58]; Palp: 0.21 + 0.09 + 0.11 + (absent) + 0.22 = [0.63]. Epigynum and vulva as in *Alaranea betsileo* new species, epigynum as in Figs. 76, 77; vulva as in Fig. 91.

Variation: ($n = 4$). Total length 2.00–2.82; ratios of carapace length/width 1.55–1.60, height/width 0.31–0.39; ratios of PER/OQP 2.09–2.55, PER/OAL 1.83–2.44, OQP/OQA 0.86–1.00, distance PM-PL/diameter PM 0.88–1.50, diameter AM/PM 1.25–1.67; ratios of clypeal height/AM diameter 1.10–1.50, cheliceral length/clypeal height 2.83–3.67; ratio of sternum length/width 1.03–1.15; ratio of length femur I/carapace width 1.87–2.17. Car-

apace yellow-brown to orange-brown, may be darker along margins of pars cephalica; abdominal dorsum with faint longitudinal brown bands exposed (Fig. 65) or obscured by small to large dorsolateral black spot (Fig. 66), may have posterior lateral dark spot or wavy line.

Natural history.—Common inside forest hanging beneath sheet webs between 0.2–2 m above ground.

Distribution.—Widespread in mid-elevation forests along the eastern side of the escarpment (Fig. 98).

Material examined.—**MADAGASCAR:** *Fianarantsoa Province:* 43 km. S Ambalavao, Reserve Andringitra, 22°14'S, 47°00'E, elev. 825 m, sifted litter, rainforest, 1♂, 5 October 1993 (B. L. Fisher) (CAS); Massif Andringitra, Mahasoia, elev. 2100 m, 1♀, October 1971 (B. Ranson) (MRAC); Parc National de Ranomafana: around research cabin, 2♂3♀, 26 March 1992 (V. & B. Roth, S. Kariko) (MCZ). Parc National de Ranomafana, from foliage, ca. 21°12'S, 47°27'E, elev. ca. 1000 m, 1♂3♀, April 1992 (V. & B. Roth, S. Kariko) (CAS); 7 km. W Ranomafana, elev. 1100 m, 1♀, 22–31 October 1988, 2♂3♀, 1–7 November 1988 (W.E. Steiner) (USNM); Elev. 1200 m, 1♀, 22 October 1988 (W. Steiner, C. Kremen, R. Van Epps) (USNM); Parc National de Ranomafana, Vohiparara, ca. 21°14'S, 47°24'E, elev. 1100 m, 4♀, 5–7 November 1993 (N. Scharff, S. Larcher, C. Griswold, R. Andriamasamanana) (CAS, USNM, ZMUC). Parc National de Ranomafana, Talatakeley, 21°15'S, 47°25'E, elev. 900 m, 7♂21♀, 5–7 December 1993 (C. Griswold, N. Scharff, S. Larcher, and R. Andriamasamanana) (CAS, USNM, ZMUC). *Toamasina Province:* Parc National Perinét, near Andasibe, 18°56'S, 48°24'E, elev. 1000 m, montane rain forest, 40♂30♀, 4–5 November 1993 (J. Coddington, S. Larcher, C. Griswold, R. Andriamasamanana, & N. Scharff) (CAS, USNM, ZMUC); Perinét, 18°55'S, 48°25'E, 1♀, 1–3 August 1992 (V. & B. Roth) (CAS); Forêt de Didy, arbustes, 1♂, March 1947 (MNHN); Mandraka, batage, 3♂7♀, December 1946 (J. Millot) (MNHN); Beanana, 15°44'S, 49°28'E, 1♂, February 1970 (A. Lambillon) (MRAC).

Alaranea alba new species

Figs. 55, 57, 58, 67–69, 78–83, 92, 98

Types.—Male holotype and 1♂3♀ paratypes from Beria, Madagascar, June 1969 (A. Lambillon) (MRAC 142.978), MRAC except 1♂1♀ (CAS).

Etymology.—The species name refers to the largely white coloration.

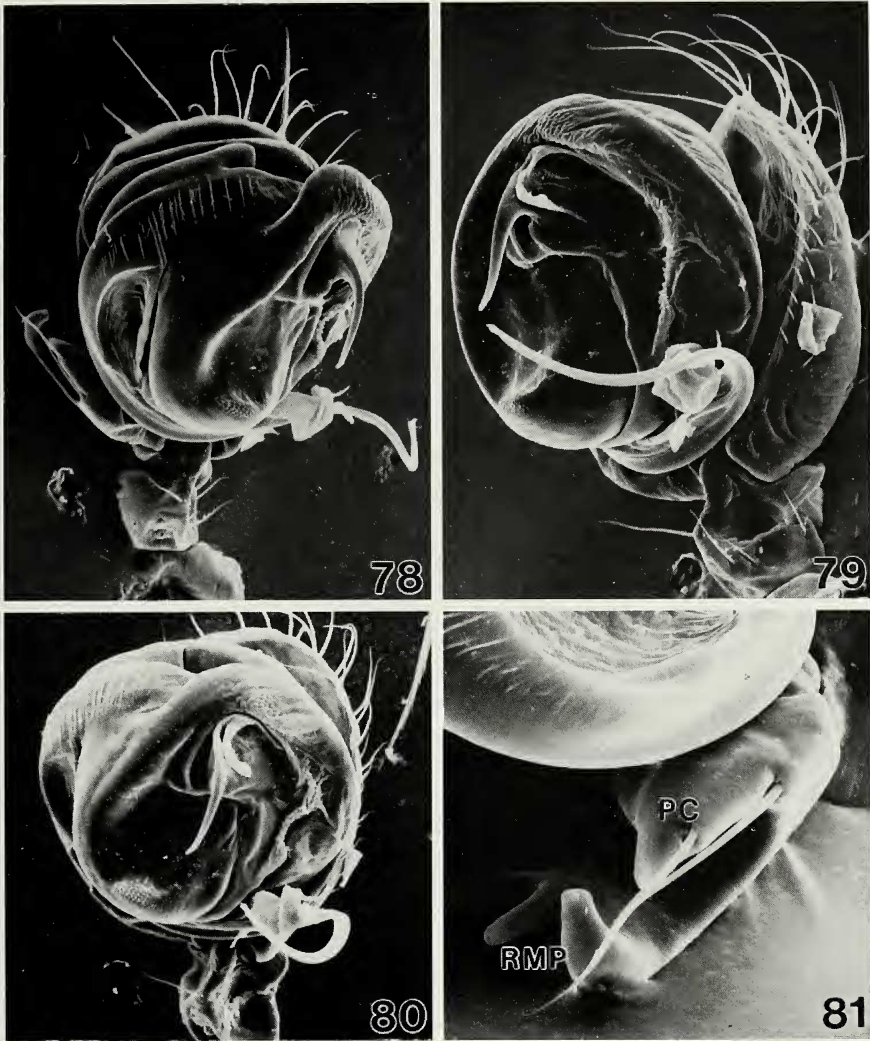
Diagnosis.—Conductor undivided, proximal point elongate attenuate (Figs. 58, 79,

80); sternum pale yellow-brown, abdomen white marked only with lateral, ventral, and posterior black spots (Figs. 67–69).

Description.—*Male (holotype):* As in Figs. 67–69. Total length 1.80. Carapace pale yellow-brown, unmarked, thoracic fovea brown, ocular area black on ocular quadrangle and between lateral eyes; clypeus, chelicerae, sternum, labium, and palpal coxae yellow-brown, unmarked; legs and palpi yellow-white, unmarked; cymbium and tegulum yellow-brown; abdomen white, with brown sclerotization extending from epigastric furrow to and surrounding pedicel to form annulate petiole, dorsum with faint dorsolateral dusky markings beneath shiny transparent scutum, with black oval spots laterally, ventrally, and at posterior apex. Carapace 0.86 long, 0.58 wide, 0.30 high, oval in dorsal view; PER 0.35 wide, AER 0.34, OAL 0.16; ratio AM:AL:PM:PL, 1.2:1.0:1.0:1.5, PM diameter 0.05. Clypeus 0.10 high, chelicerae 0.32 long. Sternum 0.44 long, 0.42 wide; labium 0.08 long, 0.12 wide; palpal coxae 0.16 long, 0.10 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 1.92 + 0.36 + 1.48 + 1.44 + 0.96 = [6.16]; II: 1.72 + 0.36 + 1.44 + 1.36 + 0.88 = [5.76]; III: 1.12 + 0.28 + 0.72 + 0.88 + 0.56 = [3.56]; IV: 1.60 + 0.30 + 1.20 + 1.04 + 0.64 = [4.78]; Palp: 0.28 + 0.10 + 0.08 + (absent) + 0.28 = [0.74]. Palp (Figs. 57, 58, 78–81) with cymbial RMP bifid, with outer ventrad- and inner distad-directed processes, PC slender, pointed in lateral view; tegulum apex weakly pustulate, TL pointed ventrally, denticulate area small; C large, single, complex, with prolateral smooth concavity and retrolateral slender basad-directed process; PP large, swollen, with recurved apical process.

Variation: ($n = 2$). Total length 1.80–1.84; ratio of carapace height/width 0.40–0.52; ratios of PER/OQP 2.54–2.69, PER/OAL 2.19–2.36, OQP/OQA 0.93–1.00, distance PM-PL/diameter PM 1.40–1.50, diameter AM/PM 1.20–1.50; ratios of clypeal height/AM diameter 1.67–2.33, cheliceral length/clypeal height 1.93–3.20; ratio of sternum length/width 0.91–1.04; ratio of length femur I/carapace width 1.63–1.65.

Female (paratype): Total length 1.72. Markings and structure as in male, except sclerotization of abdominal petiole weaker, yellow-white. Carapace 0.82 long, 0.54 wide,



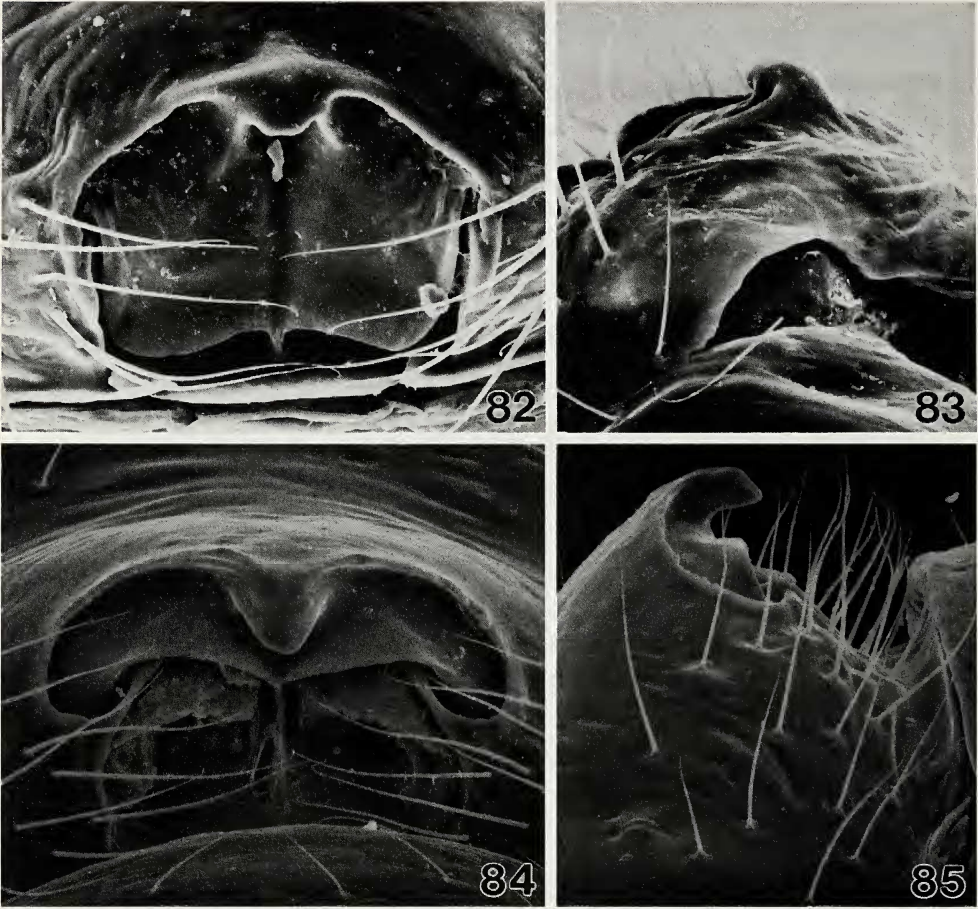
Figures 78–81.—*Alaranea alba* new species, holotype male, right palpus. 78. Retroventral view; 79. Proventral view; 80. Ventral view; 81. Cymbial base, retroapical view. PC = paracymbium; RMP = retromedian cymbial process.

0.26 high; PER 0.30 wide, AER 0.29 wide, OAL 0.12; ratio AM:AL:PM:PL, 1.5:1.0:1.0:1.0, PM diameter 0.05. Clypeus 0.10 high, chelicerae 0.24 long. Sternum 0.40 long and wide; labium 0.08 long, 0.12 wide; palpal coxae 0.12 long, 0.10 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.08 + 0.36 + 1.76 + 1.68 + 1.12 = [7.00]; II: 2.00 + 0.36 + 1.64 + 1.52 + 0.96 = [6.48]; III: 1.16 + 0.28 + 0.72 + 0.84 + 0.60 = [3.60]; IV: 1.80 + 0.32 + 1.40 + 1.20 + 0.80 = [5.52]; Palp: 0.20 + 0.08 + 0.12 + (absent) + 0.20 = [0.60]. Epigynum as in Figs. 55, 82, 83, distance from tip of S to posterior margin greater than in

Alaranea betsileo new species; vulva as in Fig. 92, hemispherical AD relatively larger in relation to HS than in other *Alaranea*.

Variation: ($n = 3$). Total length 1.64–1.84; ratios of carapace/width length 1.39–1.52, height/width 0.38–0.48; ratios of PER/OQP 2.14–2.50, PER/OAL 2.50–2.58, OQP/OQA 0.86–1.00, diameter AM/PM 1.00–1.20; ratios of clypeal height/AM diameter 1.67–2.40, cheliceral length/clypeal height 2.50–2.60; ratio of sternum length/width 0.95–1.05; ratio of length femur I/carapace width 1.78–1.92.

Distribution.—Known only from the type locality near Beria at 19°40'S, 45°23'E, in Toiliara Province, Madagascar (Fig. 98).



Figures 82–85.—Epigyna of *Alaranea* spp. 82, 84. Ventral view; 83, 85. Lateral view; 82, 83. *Alaranea alba* new species, paratype; 84, 85. *Alaranea ardua* new species, Marojejy.

Material examined.—Only the type series.

Alaranea ardua new species
Figs. 84–89, 93–98

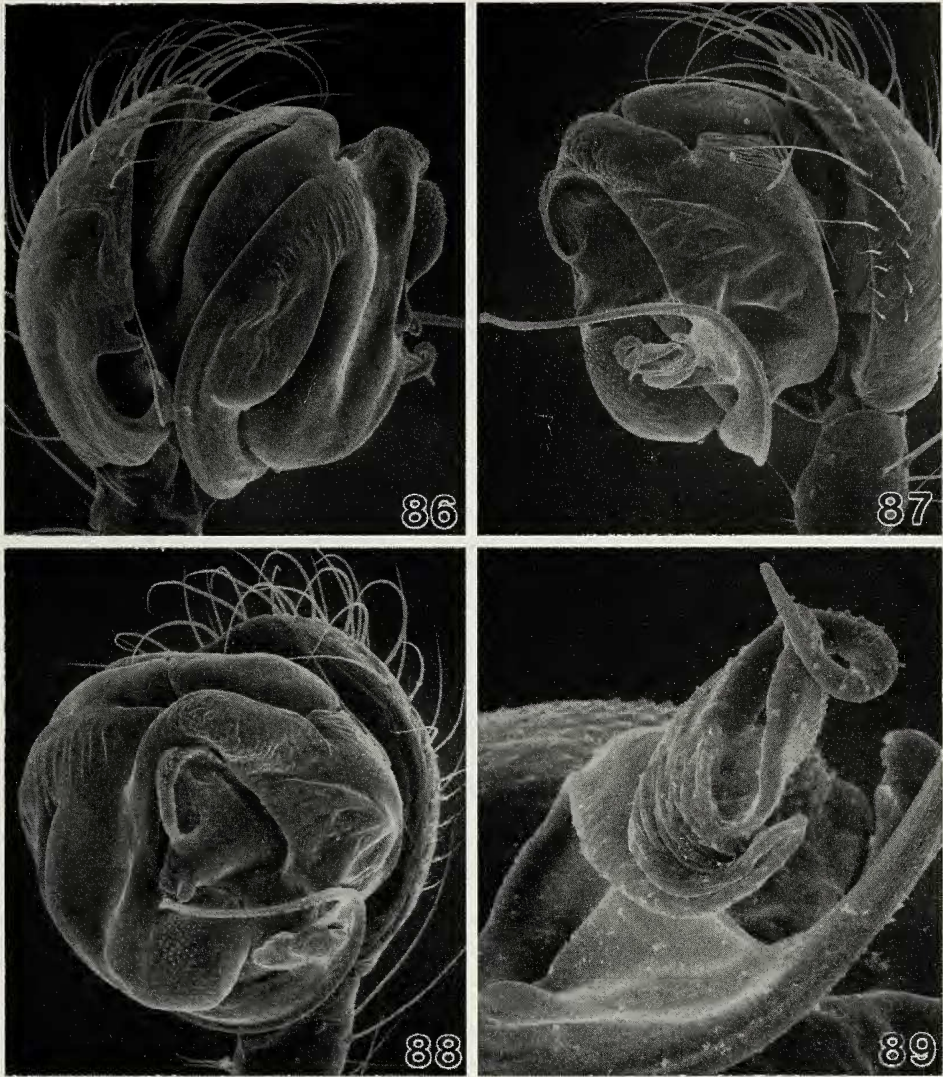
Types.—Male holotype and female paratype from Madagascar, Antsiranana Province, Marojejy Reserve, 8.4 km NNW Manantenina, montane rain forest, 14°26'S, 49°45'E, elev. 700 m, 10–16 November 1993, C. Griswold (CAS).

Etymology.—The species name is from the Latin for difficult, hard-won.

Diagnosis.—Conductor simple, proximal point thick, bifid, equal in width to cup (Figs. 86–88); dorsum of abdomen with sinuate longitudinal dark bands diverging from apex to middle and converging posteriorly (Figs. 95, 96). There seem to be no consistent characters to separate females of *ardua* from *merina*,

though the carapace of *ardua* (Fig. 96) tends to be darker than that of *merina* (Fig. 66).

Description.—*Male (holotype)*: Total length 2.79. Carapace (Fig. 95) dusky orange-brown, faintly mottled with grey, especially along lateral margin, small dark longitudinal band anterior of thoracic fovea; ocular area black surrounding AM and lateral eyes, ocular quadrangle dark grey; clypeus yellow-brown, dark grey mark beneath AM narrowing to clypeal margin; chelicerae orange-brown, with faint dark basal streaks; sternum, labium, and palpal coxae red-brown with dark mottling, sternum black along ridges of rugosity, appearing nearly black; coxae, legs and palpi white, unmarked, palpal tibia yellow-brown, cymbium dark red-brown (Fig. 94); abdomen white, dorsum (Fig. 95) with paired longitudinal dark grey bands beneath transparent

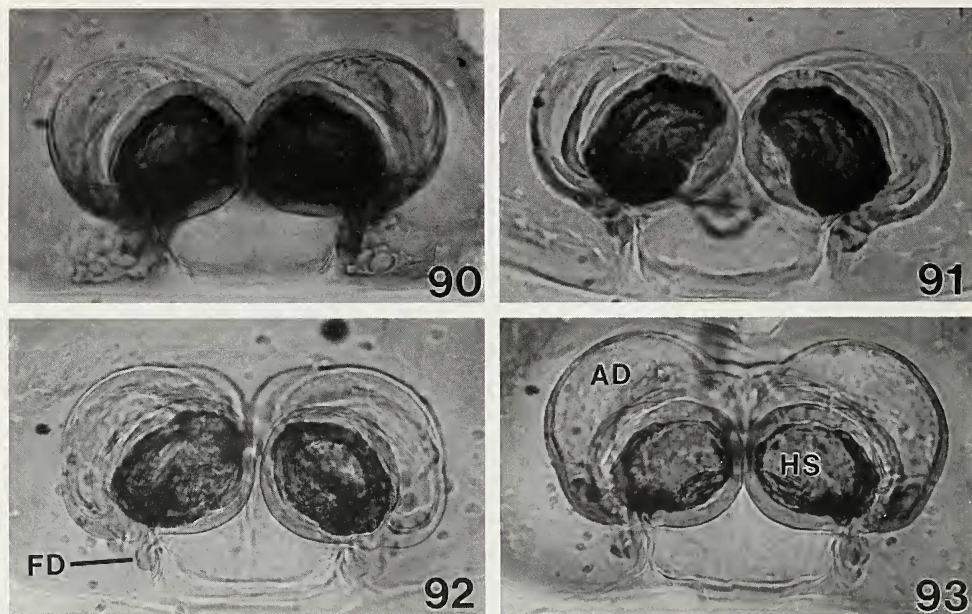


Figures 86–89.—*Alaranea ardua* new species, male from Marojejy, right palpus. 86. Retrolateral view; 87. Prolateral view; 88. Ventral view; 89. Parembolic process.

shiny scutum, area between these bands dusky, sides and posterior apex with black spots, venter grey between epigastric furrow and spiracle, dark brown sclerotization extending from epigastric furrow to and surrounding pedicel to form annulate petiole. Carapace 1.24 long, 0.76 wide, 0.35 high, trapezoidal in dorsal view; PER 0.47 wide, AER 0.44 wide, OAL 0.21; ratio AM:AL:PM:PL, 1.28:1.14:1.0:1.14, PM diameter 0.07. Clypeus 0.14 high, chelicerae 0.34 long. Sternum 0.59 long, 0.58 wide; labium 0.13 long, 0.18 wide; palpal coxae 0.21 long, 0.16 wide. Leg measurements (femur + patella + tibia +

metatarsus + tarsus = [Total]): I: $1.53 + 0.28 + 1.28 + 1.13 + 0.70 = [4.92]$; II: $1.51 + 0.25 + 1.17 + 1.04 + 0.64 = [4.61]$; III: $0.98 + 0.23 + 0.64 + 0.59 + 0.38 = [2.82]$; IV: $1.28 + 0.21 + 0.96 + 0.85 + 0.45 = [3.75]$; Palp: $0.18 + 0.07 + 0.05 + (\text{absent}) + 0.18 = [0.48]$. Palp (Figs. 86–89) with bulb marked as in *Alaranea betsileo* new species, cymbial RMP very short, acute, PC slender in lateral view; tegulum apex pustulate, TL large, convex, denticulation extensive; C large, retrolaterally dentate, with projecting basal article; PP with apical recurved hook.

Variation: ($n = 3$). Total length 2.57–3.00;



Figures 90–93.—Vulvae of *Alaranea* spp., cleared, dorsal view. 90. *Alaranea betsileo* new species, from 7 km W Ranomafana; 91. *Alaranea merina* new species, Mandraka; 92. *Alaranea alba* new species, paratype; 93. *Alaranea ardua* new species, Marojejy. AD = afferent duct; FD = fertilization duct; HS = spermathecal head.

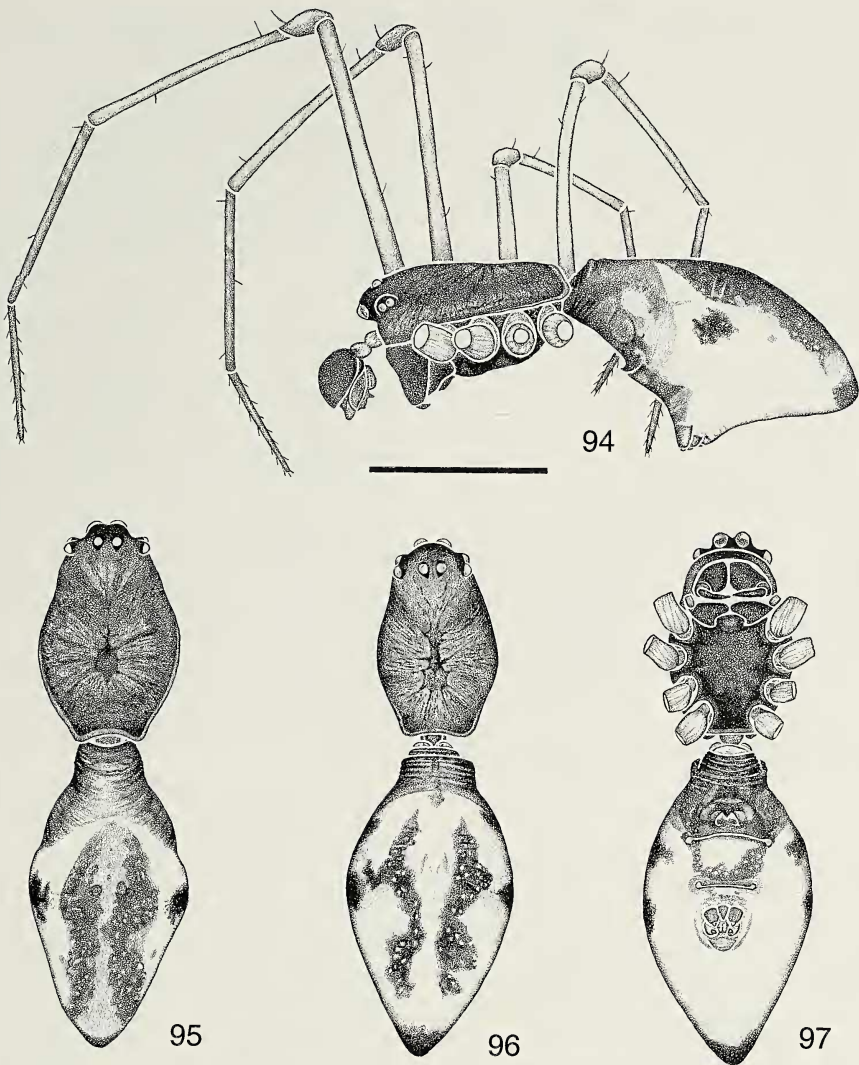
ratios of carapace length/width 1.60–1.64, height/width 0.45–0.46; ratios of PER/OQP 2.25–2.55, PER/OAL 2.00–2.25, OQP/OQA 0.81–1.11, distance PM-PL/diameter PM 1.00–1.43, diameter AM/PM 1.14–1.57; ratios of clypeal height/AM diameter 1.44–1.62, cheliceral length/clypeal height 2.19–3.30; ratio of sternum length/width 1.02–1.07; ratio of length femur I/carapace width 1.90–2.15. Markings of carapace range from dusky orange-brown to dark brown, dorsum of abdomen with longitudinal dark markings narrow and separate (Fig. 95) to completely black beneath scutum, lateral transverse marks forming spot or band connected to dorsum.

Female (paratype): Total length 2.74. Markings (Figs. 96, 97) as in male except chelicerae, abdomen, and palpal coxae dark reddish-brown, sternum and petiole black, dorsum of abdomen with broad median black mark, this extending anteriorly to sclerotized petiole in two bands surrounding white mark, and extending laterally to form median transverse band, posterior tip black, venter pale. Carapace 1.13 long, 0.71 wide, 0.31 high; PER 0.45 wide, AER 0.43 wide, OAL 0.20; ratio AM:AL:PM:PL, 1.5:1.33:1.0:1.17, PM diameter 0.06. Clypeus 0.11 high, chelicerae 0.35

long. Sternum 0.56 long, 0.48 wide; labium 0.11 long, 0.19 wide; palpal coxae 0.21 long, 0.13 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 1.34 + 0.28 + 1.15 + 1.23 + 0.64 = [4.64]; II: 1.28 + 0.25 + 1.21 + 1.15 + 0.64 = [4.53]; III: 0.76 + 0.21 + 0.55 + 0.51 + 0.40 = [2.43]; IV: 1.17 + 0.21 + 0.87 + 0.74 + 0.47 = [3.46]; Palp: 0.26 + 0.08 + 0.14 + (absent) + 0.26 = [0.74]. Epigynum and vulva as in *Alaranea betsileo* new species, epigynum as in Figs. 84, 85; vulva as in Fig. 93.

Variation: ($n = 3$). Total length 2.32–3.46; ratio of carapace height/width 0.45–0.52; ratios of PER/OQP 2.16–2.39, PER/OAL 2.16–2.26, OQP/OQA 0.90–1.00, distance PM-PL/diameter PM 1.00–1.43, diameter AM/PM 1.28–1.50; ratios of clypeal height/AM diameter 1.11–1.40, cheliceral length/clypeal height 3.00–3.80; ratio of sternum length/width 1.02–1.15; ratio of length femur I/carapace width 1.98–2.20. Markings of carapace range from orange except black ocular area to all dark brown; dorsal abdominal markings range from faint to bold, dorsolateral bands may be narrow and broken, solid and separate (Fig. 96) or meeting medially, or entirely black.

Natural History.—Common inside forest



Figures 94–97.—Morphology of *Alaranea ardua* new species, from Marojejy. 94, 95. Male; 96, 97. Female; 94. Lateral view; 95, 96. Dorsal view; 97. Ventral view. (Scale bar = 1 mm)

hanging beneath sheet webs between 0.2–2 m above ground.

Distribution.—Known only from the type locality (Fig. 98).

Material examined.—MADAGASCAR: *Antsiranana Province*, Marojejy Reserve, 8.4 km NNW Manantenina, montane rain forest, 14°26'S, 49°45'E, elev. 700 m, 10–16 November 1993 (J. Coddington, N. Scharff, S. Larcher, C. Griswold, and R. Andriamasamanana) 13♂11♀ (CAS, ZMUC, USNM).

DISCUSSION

So far as is known, Malagasy cyatholipids occur in moist forest, the majority being re-

corded from above 600 m elevation along the eastern slopes of the central mountain chain (Fig. 98). At least *Alaranea merina* new species occurs at over 2000 m. *Ulwembua antsiranana* new species, which occurs in an area of local orographic rainfall, is disjunct from the main distribution of Cyatholipidae. Restriction to moist forest appears likely. Collecting by the author and colleagues in drier habitats never revealed Cyatholipidae.

At least two Malagasy genera, *Ulwembua* and *Alaranea*, show affinities to taxa occurring in tropical or subtropical montane forests of eastern Africa. *Ulwembua* was previously known from three species from South Africa

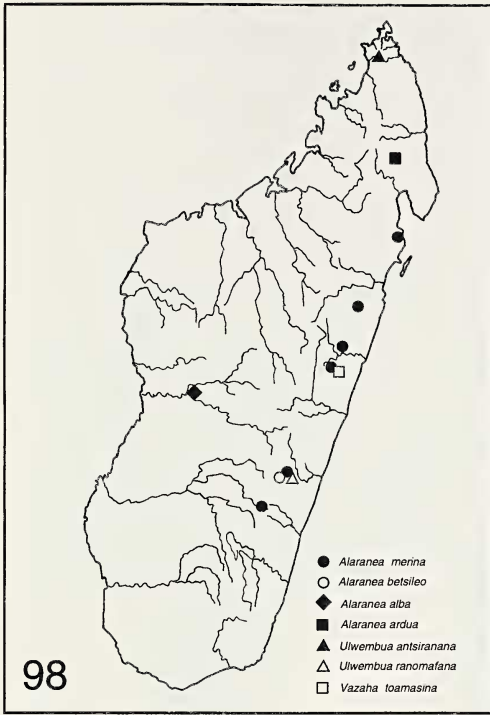


Figure 98.—Map showing distributions of Cyatholipidae in Madagascar.

(Griswold 1987): *U. outeniqua* Griswold from the coastal forests of central Cape Province, and *U. pulchra* Griswold and *U. denticulata* Griswold from Zululand. Undescribed species of *Ulwembua* also occur in the mountains of Tanzania. *Alaranea* new genus shows affinities to an undescribed genus occurring in montane forests from Malawi to Kenya. The distribution of the sister groups of these Malagasy cyatholipids is consistent with the Afromontane biogeographic pattern detailed for spiders by Griswold (1991) in which the sister area of Madagascar comprises the tropical montane forests of the eastern part of Africa. Several groups of spiders, including *Phyxelida* and the *Lamaika* group of the Amaurobiidae Phyxelidinae (Griswold 1990) and *Ulwembua* and *Alaranea* of the Cyatholipidae, show this intercontinental disjunction, suggesting that their distribution is not the result of accidental dispersal. Their distribution may date from times of former connection or at least greater proximity between Madagascar and eastern Africa, perhaps in the Mesozoic (Rabinowitz et al. 1983). Phylogenetic and biogeographic evidence continues to support the suggestion

that the Afromontane biota, at least the arachnid component, is ancient.

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